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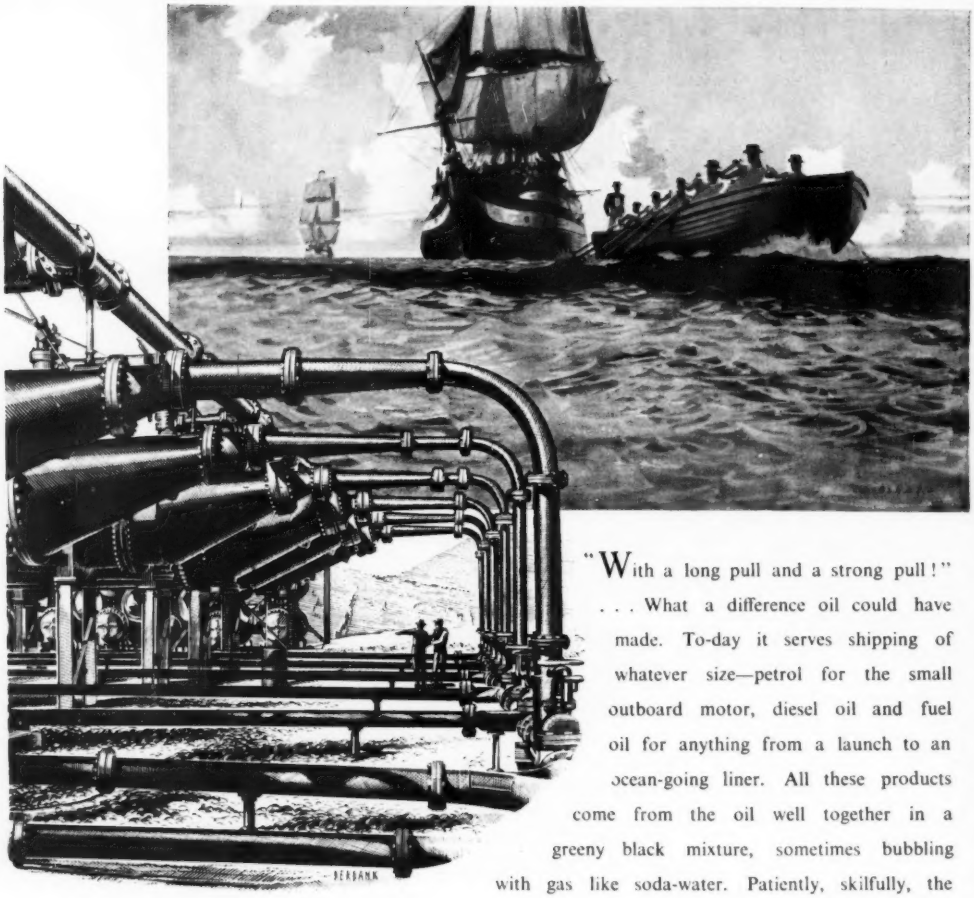

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THE SHIPPING WORLD

THE FUTURE OF ALUMINIUM IN SHIPBUILDING

THE WAY of the pioneer in ship design and construction is always difficult. It cannot be otherwise, for ships must always be seaworthy for 25 years or more and nothing can be left to chance in the interest of some gain in economic efficiency. It may be, of course, that shipbuilders, like anyone else, have their share of inertia when reviewing any process or material which may introduce sweeping changes in their technique of construction. In this connection a remark by Mr. E. Player in a discussion on the symposium given by the Aluminium Development Association in 1949 should be recalled. After some condemnation by a well known builder of the case which had been made out for aluminium in shipbuilding, Mr. Player, managing director of Birmid Industries, Ltd., said that probably just 100 years before that meeting there had been a similar meeting between iron masters and shipbuilders, where the protagonists of iron had done their utmost to convince shipbuilders that iron would float if made in the right shape. It is very tempting to assume that it is sheer inertia to change which has been the principal obstacle in the development of marine applications of aluminium, but this is too easy a solution. No industry could retain its place as the world leader in ship design and construction, which British shipbuilding certainly has done, if there were any serious prejudice against new ideas. The view of a shipyard naval architect expressed in an article in THE SHIPPING WORLD of February 7, admirably reflected many of the criticisms of aluminium made within the industry, and has served a useful purpose in that well informed replies to the criticisms have been received from several authorities in the aluminium industry, some of the contributions being published in the present issue.

The criticisms made by the shipyard naval architect dealt mainly with difficulties in supply of ingot, particularly from a dollar area, both in peace time and wartime, the question of repair facilities abroad, the alleged inability to weld aluminium, limitations on size of rivets which could be used, and confusion in identification of and multiplicity in the number of alloys produced. There can be no doubt that the supplies of ingot are adversely affected by our having to buy some 80 per cent of the aluminium at present used from dollar sources and a contributor who prefers to remain anonymous makes the pertinent comment that the £36 million ploughed into the groundnut scheme would have shown a better harvest if it had been invested in building aluminium reduction plant in the sterling areas of the British Empire and Commonwealth. The truth of this cannot be denied, as supplies of bauxite and water power are both available in various areas, but unfortunately the present Government no doubt regarded a grandiloquent scheme for increasing food supplies as being more desirable politically than a mere measure for assisting the wide range of industries dependent on aluminium supplies. On the question of the ability of the aluminium industry in this country to produce sufficient material for use in aircraft during wartime, as well as for ships, the naval architect critic is seen to have been on less sure ground, as demonstrated in a letter from Mr. C. G. McAuliffe, who shows that while the capacity of the industry was only 38,000 tons at the beginning of the last war, 175,000 tons of plate, sheet and strip could now be produced if supplies of ingot were unrestricted. As a production of 100,000 tons was sufficient to meet all demands at the peak of aircraft construction during the last war, a considerable surplus for other purposes could be produced, while capacity, it is fairly certain, could readily be further expanded.

In another contribution in this issue Dr. E. C. B. Corlett refutes the allegation that the use of aluminium alloys would complicate repair facilities abroad as, in fact, there are no difficulties in working the material, while a further important point is that the cost and difficulty of transporting aluminium plates and extrusions to repair establishments abroad are less than those encountered in transporting steel. The question of welding aluminium is dealt with in a separate article dealing with the American "Aircomatic" process, while it is clear from a recent A.D.A. publication, which will be reviewed in a later issue of THE SHIPPING WORLD, that it is now readily possible to use light alloy rivets up to $\frac{7}{8}$ in. diameter. On the other hand, the naval architect's criticism that there is much confusion in the identification of various types of aluminium alloys is perfectly valid, and some simplification is overdue.

Current Events

What is Sea Power?

LIBERAL civilisation throughout the world owes everything to British sea power, and that means the men-of-war and the merchant ships of this country. Sea power is a double-acting and interdependent machine which is apparently beyond the comprehension of the Prime Minister and his colleagues. Since it was announced that an American admiral was to be appointed supreme commander in the Atlantic of the naval forces under the North Atlantic Treaty, it has been suggested in the House of Commons that, as the United States has the larger volume of naval tonnage in commission, this decision might be regarded as almost inevitable. But that is to take altogether too narrow a view of the matter. What would have been the fate, not of this country only but of all the Allies in the two world wars, if we had not possessed overwhelmingly strong fleets of merchant shipping to cooperate with

men-of-war and aircraft in keeping trade moving? There is no doubt as to the issue. The enemy would have won. In the First World War we sacrificed about half our ships in the cause of world freedom, as well as thousands of lives, and the double sacrifice was made again in the last war. On both occasions, shipowners, at an enormous price, made good the losses of ships. That the British Navy has been neglected in the past six years, and is now relatively weaker than ever before, is not their fault. It arises from the blindness of those in the seats of the mighty to appreciate the importance of men-of-war, acting in association with merchant ships and aircraft, in shaping the course of events. It was pleaded that the cheeseparing naval policy was justified because submarines might sink surface men-of-war or they might be destroyed by the atom bomb. If shipowners had, for the same specious reasons, refused to replace their losses, what would be our position today? Happily private enterprise was not as timorous as those in control of the nationalised fleets of men-of-war who wanted apparently to save money so as to establish the Welfare State. That was, in their view, the vital objective. The result is that, though the Royal Navy is merely the shadow of what it was in the days of the Two Power Standard, this country, by reason of its great merchant fleets, remains the premier maritime power, without whose wholehearted and skilled cooperation victory in any future war would be impossible. We remain the dominant power at sea, backed on land by shipbuilding resources which are unequalled by any other country, for we are the shipbuilders to the world.

The Influence of British Sea Power

In these circumstances, the idea of any but a British admiral commanding the fleets of the North Atlantic Treaty countries would not only be a humiliation, but would be a denial of the implications of the established fact that in sea power we are still supreme, as we have been for a thousand years and more. What would Mahan, as proud of his country's history by sea as anyone in the United States, have said if it had been proposed in his day that an American officer should hold such an appointment? He freely acknowledged the debt which the world owed to British sea power. "Why," he asked, "do English innate political conceptions of popular representative government, of the balance of law and liberty, prevail in North America from the Arctic to the Gulf of Mexico, from the Atlantic to the Pacific? Because the command of the sea at the decisive era belonged to Great Britain." In discussing the proclamation of the Monroe doctrine, Mahan declared that the British Navy "ensured beyond peradventure the immunity from foreign oppression of the Spanish American colonies in their struggle for independence." In this matter, British and American opinion is fortunately not divided today, any more than it was in Mahan's time. The two nations respect each other, each acknowledging the claims of the other in various spheres. It is not in the interests of liberal civilisation that the contributions of British sea power should be underestimated. It suppressed piracy and put down slavery; it has always been the bulwark against the designs of dictators; and it has kept the trade routes open to the ships under all flags. It has proclaimed the freedom of the seas to one and all and has practised what it has preached.

Busy Shipyards

The decline in the proportion of world tonnage launched in the British Isles last year was due to the increased activity in the United States, Japan, Holland and Denmark. Lloyd's Register records without comment that the Japanese output rose to 97 ships of just under 348,000 tons, a remarkable achievement in the circumstances, and of these 18 of 83,779 tons were for registration outside that country. But shipbuilders in Great Britain and Northern Ireland can look back on satisfactory progress even though the proportion of their launches in relation to the world figures was only 37.9 per cent, compared with 53.0 per cent in 1946 and 56.7 per cent in the following year. In 1948 and 1949 the proportion dropped to 50.9 per cent and 40.5 per cent. There is, indeed, nothing to complain of so far as last year is concerned and, as has been already recorded in The Shipping World, the larger yards are assured of full employment for a long time ahead, while the outlook for the smaller establishments is brighter than it was. The most remarkable feature in Lloyd's Register returns is that, including those of less than 1,000 tons each, tanker tonnage represents 46.6 per cent of the total British output for 1950. This percentage is compared over a period of years:—

1934—15.0 per cent	1945—23.6 per cent
1935—10.2 " "	1946—27.2 " "
1936—17.4 " "	1947—11.7 " "
1937—15.7 " "	1948—25.0 " "
1938—22.6 " "	1949—34.3 " "
1950—46.6 per cent	

The highest percentage recorded was 48.5 in 1931, but this represented the comparatively low tonnage figure of 242,222 tons. Everything indicates that for many months ahead the construction of tankers will be responsible for at least half the labour of the industry. It is hoped that the rise in freights which has recently occurred may encourage tramp owners to place further orders. Optimists believe that the high level will be maintained owing to the supply of tonnage being inadequate to the demand, since imports of coal into this country are likely to continue for some time and there is no indication that the British Government intends to abandon bulk buying, which has proved so injurious to the smooth flow of trade.

Freights and Costs

The Chamber of Shipping index number of tramp shipping freights for January is 151.9, a rise of 36.2 points over that for the previous month, which was itself the highest figure recorded since the index was revived by the Chamber in 1948. The rise of 36.2 points is the greatest movement shown in the index, and is double the gain shown by the December number over November. Mr. C. E. Wurtzburg made a timely reference to this subject in his presidential address, which was reported in full in last week's Shipping World. There is a tendency to assume, first, that shipowners are making fortunes and, secondly, that they have in some way made a "corner." As the new president pointed out, recent high freights have come about simply because there are at the moment insufficient ships to meet the demands suddenly and simultaneously thrust upon the merchant fleets, not of this country alone, but of the whole world, for shipping, in spite of limitations due to flag discrimination, remains an international industry. When rates are high, it is claimed that shipping is profiteering, no mention being made of rising costs, wages, fuel, dock charges and delays in port, whereas when they are low, while operating costs remain high, as is usually the case, the troubles of owners are ignored. But, in fact, at the present time, the industry is not in a healthy state, owing to the policy of taxing undistributed profits that should be available for replacement. The resources of the industry are being exhausted owing to the excessive demands of the tax gatherers; the money which should be set aside for the payment of wages in shipbuilding and equipment is being frittered away in a way unknown at any time in the past. The shortage of handy tonnage is likely to prove a serious matter in years to come and, indeed, all tramp owners are embarrassed by the problem of replacement, for they have no such protection as is enjoyed by liners with their conferences. But it is not only one section of the industry which is suffering from penalising taxation, but every section. This is a matter which the General Council of British Shipping will no doubt bring to the attention of the Chancellor of the Exchequer before the final lines of his Budget are

settled, for the maritime industries under private enterprise make a contribution to the economic strength of the country in the form of exports with which he cannot dispense if we are to remain solvent. Mr. Gaitskell may still believe in nationalisation, but he cannot ignore their mounting losses.

Raw Materials and Shipping

THE ABNORMAL demand for tonnage has brought much work for shipbrokers, but behind this activity there is much anxiety. It was expressed by Mr. H. E. Ruffle at the annual meeting of the London and District Chartered Shipbrokers' Association when he said that what might be described as the prosperous position of today could not be regarded with anything like the same satisfaction as if it had been brought about by more normal means, and by a genuinely healthy expansion of international trade. What has happened, in fact, is that since the middle of last year stockpiling and rearmament have transformed a position of accumulating surplus industrial production to a position of acute shortages of raw materials. This subject was referred to by Mr. C. R. Wheeler, who is chairman of the British Iron & Steel Corporation (Ore), Ltd., and during the war was in charge of raw materials in the Iron & Steel Control, at a meeting of the Industrial Co-Partnership Association. The short-term nature of the Marshall Plan, he stated, had encouraged projects in which a quick return could be expected, placing an undue emphasis on "finishing" industries; so that the world's industrial capacity had expanded far more rapidly than its production of basic raw materials. In the next decade, he forecast, a high proportion of capital would have to be concentrated in projects for bringing raw material production in line with industrial capacity, by opening up new sources of supply. Mr. Wheeler described the consequences of the coal shortage, which is likely to hinder iron ore supplies, and has seriously affected the shipping position. Each attempt to improve the general raw materials crisis by meeting a particular deficiency in one part of the world almost inevitably results in a repercussion on normal movements of basic raw materials. "The consequences of these panic stop-gaps are far more serious to the world's available shipping tonnage than is represented by the actual movement of the commodities. I suppose at no time since the war have more ships been proceeding about the oceans of the world in ballast than at the present moment." The world's shipping, he said, might be adequate to the trade in hand if the normal operations of chartering without haste were allowed to take place. In the world of shipping, experience had shown that intervention by Governments rarely improved a situation, and usually tended to drive tonnage away from the most important routes. In dealing with the new difficulties, he hoped the Government would remember that "the fundamental basis of our relative success in the management of raw materials in the last war was the avoidance of any set pattern in raw materials controls, and the fitting of methods to suit the particular industry involved."

Increased Insurance Costs

THE Joint Hull Committee has revised the Understanding which governs the rating of shipowners' insurance renewals, and the outstanding feature of the revision is that on all renewals, dating from February 23, an all-round increase in rate of 10 per cent will be required, irrespective of record. Where the credit balance of premiums over the last three years is under 40 per cent, the sliding scale of increases will still be applied to renewal rates and the additional 10 per cent will be applied after the increase "on record" has been determined. Another feature of the new Understanding is that where previously the more severe Formula A of increases applied to risks with an aggregate value of under £6,000,000, and the less severe Formula B to risks with an aggregate value of over that amount, the revised Understanding fixes the dividing line between the two Formulæ at £7,500,000, thus bringing within the more severe Formula A, risks which previously enjoyed the less severe Formula B by reason of their aggregate value being between £6,000,000 and £7,500,000. The two Formulæ remain unaltered except that in both the scale now omits the final item applicable where there is a credit balance. In the case of Formula A this is the increase of 30 per cent where there is a credit balance of under 20 per cent, and in the case of Formula B it is the increase of 12½ per cent where there is a credit balance of under 25 per cent. In cases where there is no credit balance, or an actual loss, the minimum increase under Formula A remains at 30 per cent, and under Formula B at 15 per cent. This revision of the Joint Hull Understanding represents the first all-round increase in the cost of hull insurance since the war. Indeed in the autumn of 1945 the Understanding was revised to allow an all-round reduction of 5 per cent, plus a further reduction representing 50 per cent of the increases "on record" paid by shipowners during the war. That concession was made in anticipation of an improvement in casualty experience resulting from a reversion to normal navigational conditions, but that improvement never materialised, the number of casualties increasing from 1946 to the later months of 1948 from some inexplicable cause. Nevertheless every revision of the Joint Hull Understanding after the war, until that of October last, represented a benefit to shipowners on the whole. While the last revision tightened up the requirements of the Understanding to some extent, Mr. T. H. Blackham, speaking at the annual meeting of the Liverpool Underwriters' Association, said that many underwriters were surprised that it did not appear to take into account the increased cost of claims due to rising prices and the effect of devaluation. The effect of the new Understanding will be to increase the cost of insurance to shipowners, but not beyond a reasonable increase in view of the still rising cost of ship repairs and other factors which affect marine underwriters adversely.

Capital Reorganisation

SINCE 1948 the board of United Molasses has been considering the advisability of capitalising a portion of the huge accumulated reserves of the group with the object of restoring the capital to the figure before the drastic reorganisation scheme of 1934. In that year, it may be recalled, the then £1 shares were written down to 6s. 8d. Part restoration is now to be made. A scrip bonus of 100 per cent is proposed and will absorb £1,954,500. It had been intended to distribute a bonus of 200 per cent, but the Treasury rejected this larger scheme. Why it did so is not clear: the aggregate at December 31, 1949, was £9,829,000 and it will doubtless be enlarged by 1950 profit retentions. In any event, these share bonus payments are no more than a book-keeping transaction designed to bring nominal capital into alignment with capital employed, that is the issued capital plus capital and revenue reserves and the carry forward. Share bonuses add not one penny to the intrinsic worth of a shareholding save that they do, by enlarging the capital, sometimes improve marketability. United Molasses has at the same time declared a second interim dividend for 1950 of 10 per cent, following the earlier payment of an interim of 10 per cent. For 1949 the dividend was 27½ per cent (plus 2½ per cent tax free from reserves) while the earnings cover was 62 per cent. Profits will have risen in 1950 owing to the strength of the molasses and of tanker and other freight markets, but what the company will finally distribute from these profits has yet to be revealed. Market estimates range from 40 per cent on the present capital to 55 per cent. In any event the company's share bonus and dividend announcement pleased the market and the 6s. 8d. ordinary units responded with an immediate jump in price of just over 4s. to 60s.

Reserves and Capital

The English Electric group covers a broad production and marketing field in the electrical, aircraft and general engineering industries. At one time concentrating on the heavy side of the supply of electrical equipment, it has greatly spread its activities, and with a success that is apparent at all points of the group accounts for 1950. These show a rise in trading profits from £2,661,000 to the record figure of £4,085,000. Thus, though depreciation takes considerably more at £849,000 against £678,000 and tax absorbs £1,896,000 compared with £1,046,000, the net profit emerges usefully higher at £1,050,000, against £709,000. Ample cover is thus left for an ordinary dividend, which is raised by 5 per cent to 15 per cent. Preference and ordinary dividend payments require no more than £412,000 net, and are exceeded by the general reserve transfer of £500,000 and the addition of £138,000 to the carry forward. In the year under review, the company raised, for development purposes and to strengthen the liquid position, some £4,000,000 in new debenture and ordinary capital. But so great has been the volume of turnover, so steeply have prices risen and so heavy have been the demands of the tax gatherers that, at December 30 last, the group was still owing £5,104,000 on bank overdrafts. The cash holding of £942,000 was then slightly under the capital commitments' total of £969,000.

Effect of Rearmament

The group will, doubtless, play a large part in the rearmament programme—it manufactures the Canberra jet bomber and has Marconi's Wireless Telegraph and Marconi International Marine among its numerous subsidiaries—and it thus seems likely that, at some time in the not too distant future, it may have to raise fresh capital. The reserve position is such as to provide strong financial defences. The reserves aggregate £7,730,000, or getting on for twice the issued ordinary capital of £4,129,000. Fixed assets of £8,537,000 have been drastically written down and are a most conservative valuation, while the gross work-in-progress figure of £25,380,000 sufficiently indicates the size and importance of group activities. Profits of Marconi's Wireless Telegraph rose last year from £259,000 to £286,000 and a dividend of 7 per cent is being paid. At the end of the year that company had group assets of nearly £7,000,000, with ample reserves as backing to the share capital. Marconi's International Marine had a 1950 revenue of £1,436,000, against £1,279,000, and is distributing a well covered dividend of 10 per cent. Its reserve portion is sound but, as in the case of Marconi's Wireless and of the parent company, there are signs of pressure on liquid resources.

Fresh Water Distillation in Liners

When the P. & O. liner *Himalaya* sailed on her maiden voyage in October 1949, she carried the first installation of a new type of fresh water distiller which had been designed by the P. & O. Company's superintending engineer, Mr. Sydney Smith. Since then the *Himalaya* has made six round trips to Australia and back, and reports from the company indicate that the apparatus has proved an unqualified success. The distiller has a daily capacity of 350 tons of fresh water: some 35 tons of this is required as feed water for the boilers, and the remainder is available for domestic use. Fresh water is still purchased ashore at ports where its cost is less than the cost of distillation (9d. per ton), but throughout the tropics the distilling plant has been in regular use, and the average annual production of distilled water is more than 40,000 tons. This water is, of course, perfectly sterile, and is made palatable by a system of aeration. The advantages of the use of distilling plant include the saving of time at ports of call where fresh water would otherwise have had to be taken on board, and the saving of 1,700 tons in weight where full tanks would otherwise be needed, increasing the deadweight capacity of the ship by this amount. Alternatively, if this extra deadweight is not used, a saving of 6 tons of fuel a day at a speed of 22 knots can be made, though against this should be set the fuel consumption of the distilling plant. It is estimated by the company that on a round voyage to Australia of about ten weeks, the use of the plant results in a saving of the order of £1,500. Similar distilling plant is fitted in the *Chusan*, which entered service last summer, and it is likely to be installed in the two new vessels which the company has recently ordered.

Welding in the Shipyards

While there have been many important advances in the technique of, and in the materials used in, shipbuilding and marine engineering during the past ten years, there is little doubt that the most important and that most likely to revolutionise shipbuilding in future years, is the introduction of electric welding for other than minor structural applications. The chief reason for this view is that it has been found essential, in the economic use of welding, to make sweeping changes in shipbuilding methods, usually involving radical modifications to the layout of berths and workshops. In some instances, the number of berths in a yard have been reduced, yet potential shipbuilding output has increased, owing to the greater building efficiency of each of the remaining berths. Many yards are building vessels which are between 80 and 95 per cent welded, and it is doubtful whether there is a single shipbuilder who does not use this new method for connecting plates in the tank top, many bulkheads, all deckhouses and superstructure decks. Progress in the next few years would seem to lie along the lines of the further extension of welding and prefabricating facilities, but it may not be out of place to consider probable trends on a more long-term basis. Undoubtedly, beneficial results will be obtained from further research in and the development of more weldable steels, while a great deal remains to be done in evolving and producing more sections specially designed for welding. It must not be forgotten, however, that when the world shortage of aluminium alloys, due to rearmament, has eased, and—perhaps more to the point—as the availability of light metals at an economic price increases, as it will, aluminium will be used quite largely in shipbuildng. The difficulty hitherto has been that these metals could not be welded efficiently, but it is more than likely that the use of the "Aircomatic" process will obviate trouble in this respect. Perhaps the most pressing requirement is that even greater facilities than at present should be given for research into ship structures, beginning from the most fundamental principles, so as to produce a ship's hull specially suited to welded construction. Such a study might produce quite startling changes as regards frame spacing in relation to thickness of plates, and the most economic combination of vertical and longitudinal stiffening for the shell.

SAYINGS OF THE WEEK

A PROSPEROUS POSITION

"What might be described as the prosperous position of today cannot be regarded with anything like the same satisfaction as if it had been brought about by more normal means, and by a genuinely healthy expansion in international trade."—*Mr. H. E. Ruffle*, chairman of the London and District Association of Chartered Shipbrokers.

BRITAIN'S BEST CUSTOMER

"Norway is a most important customer to the British shipbuilder. Since the end of the war Norway has been building steadily and some 170 ships, of over 1,000,000 tons gross, have been built in British yards alone over the last five years . . . The estimated value of the Norwegian orders during those five years lies between £65,000,000 and £70,000,000."—*Mr. George Barrie*, chairman of Barclay, Curle & Co., Ltd.

ON THE "BALTIC"

DEMAND FOR TONNAGE MAINTAINED

By BALTRADER

In January last, freights here and there showed signs of stabilising for early loading and of an appreciable discount for later positions. During February the upward movement was resumed because European demand for American coal and grain was found to be insufficiently supplied in spite of the heavy shipments which had been made. As last month closed, operators of cargoes from North America again showed an indication to curb their exuberance. The report that perhaps as many as 80 American vessels will be brought into service smelling of mothball was followed by suggestions that the U.S.A. may confine the export of grain to countries in great need, such as India. Then came the news that India and Pakistan have agreed to barter coal for grain, among other mutually advantageous exchanges. This development is long overdue in the name of humanity and common sense, but it is not a bull point for shipping. Dozens of ships have been kept busy hauling necessities from afar to the two Dominions which should be able largely to supply each other without using much sea transport.

None of these considerations, however, can alter the fact that tonnage is scarce; it seems likely to remain so for some time, by reason of the large volume of recent chartering. Agents whose job it is to obtain offers of freight space all find their day's work hard. The number and variety of definite orders continues to be above the normal and much regular seasonal business, such as the transport of sugar from various parts of the world, remains to be done. The liner companies are chartering outside tonnage as little as possible, but as they cannot leave their shippers in the lurch, they have lately chartered tramps on time charter at very high rates of hire.

Demand for Standard War-built Ships

It was instructive to read the comments of John I. Jacobs & Co., Ltd., on the satisfactory performance of the T2 tankers produced during the war by the United States. One used to believe that these vessels were not fit for commercial employment, but apparently that was an ill-informed opinion. Similarly, the adverse criticism of the Liberty dry-cargo ship has been shown in practice to be much exaggerated. The Sam ships were acquired in large numbers by some British liner companies whose standards are exacting; one might have expected them to dispose of the Sams at an early date, but these vessels have evidently been too useful to be spared. Tramp owners who acquired Sam ships for £135,000 have not had cause to regret their bargain.

Before the war the open shelterdeck vessel was the standard type of large tramp vessel. The products of the war years were closed shelterdeck ships in order to obtain the utmost capacity for carrying steel and other heavy cargo. Some owners who purchased these vessels after the war converted them to open shelterdeck in order to save harbour dues and to be able to offer a greater cubic measurement per ton. The opposite process has lately been noticed, for it is possible to earn more freight with the closed shelterdecker when cargo is as abundant as at present. The more cargo the ship can carry the more charterers are satisfied.

It is only natural that the price of secondhand tonnage ready for trading has greatly increased in the last six or eight months. Owners can see much better prospects of working off depreciation within a reasonable period. This applies, of course, more particularly to vessels operated under those flags which exempt the owner from high taxation. In the case of vessels bought to trade under the British flag, it is difficult to see how it could be a good business proposition to pay £300,000 for an oil-burning 10,000-tonner of Empire or Sam type. There is a running start to work off depreciation with the help of the 40 per cent tax allowance and the current high earnings, but in succeeding years the weight of taxation will be more and more crippling. The most interesting development in the secondhand market is the enormous increase in the value of old vessels, which a year ago were worth about £50,000 or £60,000. Modern British vessels are generally either held fast by their owners by reason of the high cost of building, or are debarred from sale to foreign buyers by Government restriction; but there are some foreign buyers who appear to be determined to acquire tonnage regardless of age or cost. Of these the most pressing are the Japanese, who have been granted a fund of $10,000,000 to buy what they can. In the past few weeks they have acquired about 30 vessels, subject to licence for purchase; they would seem, in fact, to have bought more than the fund will run to, but are still looking for more tonnage. A British coal-burning vessel of 8,000 tons deadweight, built in 1930, has been sold to Japanese buyers for £221,000 and another British coal-burner of 11,000 tons deadweight, built in 1928 and soon due for survey, has fetched £275,000.

The Freight Markets

Grain chartering from North America has been quiet in the past week, but many fixtures have been arranged for coal from Hampton Roads. These include voyages to North France at $14.50, April; Antwerp or Rotterdam, 2 voyages, at $11.25, commencing late March; Algeria or Tunisia $14.25, April; Chittagong at $20, April; Gibraltar 95s., April; Buenos Aires $17.25, April and May; Hamburg $13.50, April. From the St. Lawrence to Antwerp-Hamburg, heavy grain has been fixed at $13 for June loading. *Alpha Zambesi*, 9,300 tons, is chartered for heavy grain from U.S. Northern Range to Antwerp-Hamburg range at 115s., option Gulf loading at 135s., May. A Chapman steamer will load sugar from San Domingo to U.K. at 135s., May/June. The *Rudby*, 9,500 tons, is fixed West Australia or Eastern States Australia to U.K. at 150s., basis bulk wheat ex silo, July/August. Several ships have been chartered for wheat in bags from Karachi to Antwerp-Hamburg range at 140s., April, and 150s., March. They will pass vessels fixed last week to take wheat from the Gulf of Mexico to Bombay at $23.25. A Capeside steamer is chartered from Dairen to Denmark at 235s. f.i.o., maize, beans, etc., March/April. The market for tonnage from Manchuria and North China has been quite active lately and high rates have been paid. South African coal charterers continue to want tonnage; 126s. has been paid, Lourenco Marques to West Italy, May. The strength of the time charter market was shown by fixture of m.v. *Hendon Hall*, 9,250 tons d.w., 11 knots on 10 tons at 47s. 6d. for 6 to 8 months.

Air Charter Business

Fairly active conditions in the Air Charter market are reported on the Baltic Exchange. A number of aircraft are occupied as a result of the recent good demand for carriage of machinery, etc., from the United Kingdom to Sweden. In some cases return cargoes were arranged for shipment in Scandinavia. These included reindeer meat, lobsters and machinery.

Canada and continental Europe will be directly linked for the first time by a Canadian air service on April 1, with the inauguration of Trans-Canada Air Lines flights from Montreal to Paris.

COAL AND OIL

AMERICAN COAL EXPORTS

IF THE necessary tonnage is available, the American coal industry expects to export between 15,000,000 and 20,000,000 tons of coal in 1951, according to the U.S. Coal Exporters' Federation. The secretary of the Association stated recently that the present high charter rates, and the shortage of tonnage even at these rates, were the main obstacles to the fulfilment of these figures. He expected rates to come down, however, as more vessels were withdrawn from the U.S. Reserve Fleet. British imports of American coal are expected to amount to 1,500,000 tons during the first quarter of the year alone, and large quantities will also be imported by Western Germany and India. South American countries are also planning to buy American coal, in order to make up the deficiencies caused by the lack of British coal exports. Last year the United States coal industry produced 507 million tons of coal, and this year it is anticipated that output will rise to 550 million tons.

Refinery for South Africa

ANOTHER oil importing country is to have a full-scale oil refinery. The Petroleum Press Bureau reports that Standard-Vacuum have decided to erect a refinery at Durban with an annual capacity of about 500,000 tons. Construction will start early in 1952, and will be completed in late 1953 or early 1954. The total cost will be about $12 million, or nearly £4½ million. A refinery of this comparatively small capacity is not generally an economic proposition, and it is understood that this plant will receive a measure of protection in the form of a reduction in the duties payable on finished products. The decision to go ahead with this project, which has been under discussion for a considerable time, is in keeping with the recent agreements with Standard Oil (N.J.) and Socony-Vacuum—which together comprise Standard-Vacuum—for the reduction of dollar expenditure on oil supplies to the sterling area.

Petroleum Industry Exhibition

AN EXHIBITION showing every aspect of the petroleum industry, with emphasis on exploration, on oil field, refinery and transport developments in many parts of the world, will be presented this summer at Universities in the United Kingdom. It is an industry exhibition sponsored by The Shell Petroleum Co., Ltd., and the Anglo-Iranian Oil Co., Ltd. The exhibition will be opened by Sir Henry Tizard under the auspices of the Institute of Petroleum, and will be open to the public at the Imperial College of Science and Technology, University of London, from April 6 to 21. It will then tour the Universities of Glasgow, Leeds and Cambridge, showing for approximately two weeks at each centre. The world-wide interest of this industry is to be portrayed by means of models, maps and photographs. In aim the exhibition is broadly educational in terms of scientific, technological and of general university interest. But it is also being presented in a manner designed to attract the interest of the general public in the work of the industry.

New Coal Prices

INCREASES in price of bunker coal at a number of ports have been announced by Cory Bros. & Co., Ltd. The new prices are as follows:—

Port	Price per ton	Rebate if applicable	Delivery, coal., etc.
Las Palmas	185s.	2s.	
Teneriffe	185s.	2s.	U.K./American f.a.s.
Madeira	185s.	2s.	
Dakar	185s.	2s.	U.K./American/Saar f.a.s. Mole 8.
St. Vincent	187s.	2s.	U.K./American f.a.s.
(Quantities of 50 tons and under 2s. 6d. per ton extra)			
Pernambuco	248s. 6d.	1s. 6d.	F.o.b. S. African coal
Bahia	248s. 6d.	1s. 6d.	F.o.b. S. African coal
Rio de Janeiro	232s. 6d.	1s. 6d.	F.o.b S. African/American coal
Santos	248s. 6d.	1s. 6d.	F.o.b. S. African/American coal
Monte Video	215s.	1s. 6d.	F.o.b. (50 tons and under 2s. 6d. per ton extra), Welsh coal.

NEXT WEEK'S EVENTS

MARCH 13.—"Gamma Radiography in Shipbuilding and Engineering," by J. D. Hislop. Institute of Marine Engineers, 85 Minories, London, E.C.3. 5.30 p.m.

MARCH 16.—"Pipe Joints for Hydraulic Power Transmission," by B. Cooke. Institute of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1. 5.30 p.m.

MARCH 16.—"Applications of Oceanographical Research to Navigation," by G. E. R. Deacon. Institute of Navigation, at the Royal Geographical Society, 1 Kensington Gore, London, S.W.7. 5 p.m.

WORK has begun on the first of four 12,000-tons tankers on order for the Overseas Tankship Corporation, of New York, at the Sunderland yard of William Doxford & Sons, Ltd.

Buses for Cuba

The largest single shipment of buses from the United Kingdom sailed in the steamship *Cape York* from the Royal Edward Dock, Avonmouth, on February 28. The buses, totalling 54, are part of an order for 620 Royal Tiger buses, valued at $10,000,000, secured by Leyland Motors, Ltd. To ship this order the company has chartered vessels, of which the *Cape York*, owned by the Lyle Shipping Co., Ltd., is the first. The buses are 31 ft. long, and 47 were stowed in the holds, the remainder on deck. Two heavy-duty trucks were also shipped, and 36 of the buses were fully erected. To ensure stability and make up deadweight capacity, the *Cape York* also carried a bottom cargo of 3,700 tons of cement

WORLD TANKER TONNAGE

RAPID EXPANSION OF FLEET : ANALYSIS BY AGE

THE WORLD fleet of tankers of 2,000 tons d.w. and over is at present increasing steadily at the rate of about 2,000,000 tons d.w. per annum, and, according to statistics compiled by John I. Jacobs & Co., Ltd., at December 31, 1950, had reached a total of 27,615,815 tons d.w. The 66 new ships delivered during the second half of the year had an aggregate deadweight of just over 1,092,000 tons, giving an average size of slightly under 17,000 tons d.w. This included 11 ships in the 24/30,000-tons class, compared with 18 in the first half of the year. Deductions during the same period amounted to 16 vessels with the comparatively small total of about 143,000 tons, averaging rather less than 9,000 tons d.w. These were mostly broken up or lost, but included one conversion to a cargo ship and another to a whaling factory. After a few other minor amendments, the net increase in the second half of 1950 was about 940,000 tons d.w.

As regards individual flags, the largest increase was Norwegian, with just over 275,000 tons d.w., closely followed by British with a little more than 250,000 tons d.w. These two flags accounted for about 56 per cent of the total increase. The Panamanian flag figure was practically unchanged, and the remaining one of the four major flags, namely U.S., again showed a small decrease of about 90,000 tons d.w. The substantial amount of American-owned tonnage under Panamanian, Honduran and Liberian flags has to be remembered, however, the last named having the third largest increase of about 135,000 tons d.w. and now taking eighth place in the world fleet. Although still of small proportions, the nucleus of a German tanker fleet is steadily being built up.

Tankers on Order

Turning to the new building position, it is somewhat surprising to find that, in spite of the large amount of new tonnage completed in the second half of 1950, the figure of 5,350,000 tons d.w. of tankers under construction and on order on June 30 had risen to over 5,600,000 tons d.w. by the end of the year. This means that the orders placed during that period totalled nearly 1,350,000 tons d.w. Well over 2,000,000 tons d.w. is scheduled for completion in 1951, a similar amount in 1952 and most of the balance in 1953, although a few of the recent orders are for delivery as far ahead as 1954 and 1955. In addition, it is estimated that orders announced since December 31 already reach a figure of fully 1,000,000 tons d.w., largely for 1953 delivery.

Most of the important flags are represented in the orders placed during the last half of 1950, the contracts also being well distributed among all the recognised tanker building yards, while some yards which do not normally build tankers also came into the picture. This is particularly the case in Norway, where owners are still restricted in placing contracts abroad, although not quite so rigidly as in the first half of the year. As a result, they have ordered a number of ships from Norwegian builders with delivery in some cases as far ahead as 1955. Other new entrants are several German yards, which have received a number of orders, and the only notable exception was the U.S. yards, where no new contracts were recorded and practically all the outstanding ships have now been completed. Several of the large American oil companies, however, have ordered vessels from British builders to utilise sterling funds accumulated as a result of agreements to accept payment for oil supplies in this currency.

The most popular size is 16,000/18,000 tons d.w., with many owners now favouring the 18,000-tonner. Ten new ships in the 24/32,000-tons class were ordered, and the total number of such ships on order on December 31 last was 42, almost all of them being either for account of large oil companies or already fixed on long period charters. There are also a number of contracts for vessels between 20,000 and 24,000 tons d.w. Anything below 16,000 tons d.w. is rather exceptional, and below 12,000 tons d.w. virtually non-existent as far as tramp owners are concerned. Diesel propulsion retains its pre-eminent position, but the turbine ship is increasing in popularity, especially for the larger sizes. Speeds of 14/15 knots on trials are the general standard, but are frequently exceeded.

The building situation is doubtless to some extent a reflection of the recent extremely high tanker market, in turn clearly brought about in large measure by the international tension. Assuming the continuation of breaking up on the very moderate scale seen last year, the world tanker fleet by the end of 1953 would reach the huge total of about 32,500,000 tons d.w., more than double the 1939 figure and with much more than double the carrying capacity on account of improved speed and efficiency. Should the hoped-for relief in the international outlook come about, it seems at least problematical whether all this new tonnage can be absorbed unless a much larger amount of the old tonnage is scrapped.

Age Analysis

In this connection the age analysis is of particular interest, and provides a basis from which various other age statistics can be produced. It can readily be seen, for example, that practically 70 per cent of the world fleet, or about 19,280,000 tons d.w., is not more than 10 years old, of which rather more than half consists of the T2, Liberty and other war-built American tankers. On the other hand, about 12.50 per cent, totalling about 3,450,000 tons d.w., is more than 20 years old, of which over 2,000,000 tons (about 7.25 per cent) is over 25 years old. Taking out figures on the same basis for the four main flags, the position is as follows:—

	Less than 10 years old	20 Over years old	of which 25 Over years old
U.S.	86.15%	4.38%	2.89%
British	64.25%	16.16%	9.09%
Norwegian	56.98%	7.38%	1.26%
Panamanian	77.10%	14.50%	11.35%

Thus by far the most modern is U.S., the war-built vessels having changed the entire character of this fleet, which in 1939 was probably one of the oldest. This brings to mind the frequently discussed question of the probable life of the T2 tankers, which must be of the greatest significance to American operators as well as to British, French, Italian and Norwegian owners who have acquired quite a number of them. Indeed, this big block of tonnage, approaching one-third of the world fleet and all built within a period of about three years, must be a vital factor in any considerations of the future, and yet is still an uncertain one. However, in view of the satisfactory way these ships are running today and the good reputation they have built up, it seems

AGE ANALYSIS OF WORLD TANKER FLEET
Tankers of 2,000 tons d.w. and over as at December 31, 1950

Year Built	U.S.	British	Norwegian	Panamanian	French	Dutch	Italian	Liberian	Swedish	Other Flags	Total	Percentage
1919 or earlier ...	77,752	214,084	21,524	113,279	21,834	—	138,917	12,600	—	254,457	854,447	3.09
1920/24	171,899	303,842	26,595	195,581	43,980	25,076	114,819	14,210	8,230	242,145	1,146,377	4.15
1925/29	127,521	403,354	232,884	85,676	96,324	81,938	22,640	—	20,223	387,444	1,458,004	5.29
1930/34	124,587	294,532	534,234	117,880	124,558	55,114	44,183	—	34,360	325,219	1,654,667	5.99
1935/39	503,739	809,578	720,113	110,582	75,990	355,323	41,865	—	86,623	142,966	2,846,779	10.30
1940	188,322	12,000	103,270	—	39,800	15,000	10,500	—	—	12,345	381,237	1.38
1941	276,251	229,624	41,635	58,950	15,600	—	16,510	—	—	12,076	650,646	2.36
1942	722,221	364,260	68,196	55,020	—	11,747	30,830	—	59,205	46,616	1,358,095	4.92
1943	2,341,389	303,248	89,032	335,768	35,860	—	293,268	10,558	13,500	247,683	3,670,306	13.28
1944	2,264,533	772,736	139,590	362,666	270,316	66,437	66,240	—	75,060	380,828	4,398,406	15.92
1945	1,531,121	577,311	351,545	551,192	33,120	112,269	16,560	—	38,205	300,015	3,511,338	12.71
1946	66,003	363,725	29,320	4,110	—	24,360	18,000	—	45,125	25,113	575,756	2.08
1947	3,450	115,808	78,810	—	37,711	12,180	33,000	27,928	62,595	12,000	383,482	1.39
1948	31,004	207,983	282,562	9,500	57,750	22,650	2,704	30,000	23,000	58,075	725,228	2.62
1949	79,314	287,503	413,102	370,630	75,378	31,010	—	298,352	16,400	266,889	1,838,578	6.65
1950	110,319	440,120	677,084	349,965	57,461	59,782	—	154,910	42,750	283,120	2,175,511	7.87
Total as at Dec. 31, 1950	8,608,082	5,684,030	3,809,476	2,720,893	985,682	872,876	850,036	548,558	525,276	3,090,909	27,615,815	100
June 30, 1950 ...	8,698,297	5,429,717	3,532,419	2,719,013	919,907	829,356	809,731	414,280	524,746	2,800,281	26,677,747	100

Source : John I. Jacobs & Co., Ltd., 9, St. Helen's Place, London, E.C.3.

obvious that reckless forecasts such as a life of 10/12 years will prove to be without any foundation. It is also certain that current high and advancing building costs will tend to keep these vessels in service for their longest possible economic life in the same way as many old and normally quite uneconomic tankers are already being kept in commission.

The British flag shows up rather unfavourably as regards tonnage over 20 years old, and while the Norwegian figures are much better, it should be noted that this flag has by far the largest total of over 500,000 tons in the 15/20 years age group.

Laid-up Shipping

Vessels Under Repair in U.K. Ports

The Chamber of Shipping has issued its customary comparative quarterly table of shipping out of commission at ports in Great Britain and Ireland. The accompanying tables show that on January 1, 1951, the total consisted almost wholly of vessels awaiting or undergoing repair, or small passenger vessels usually withdrawn from service during the winter months. The figures are based on returns furnished by the various dock and harbour authorities. The Admiralty figures of merchant shipping undergoing repair or reconversion in U.K. ports, given in the *Monthly Digest of Statistics*, include all vessels under repair, whether immobilised or not, and are therefore not comparable with the Chamber's figures.

Total Laid up

	British		Foreign		Total	
	No.	Tons Gross	No.	Tons Gross	No.	Tons Gross
1 Jan., 1950	212	1,055,212	18	66,623	230	1,121,835
1 April, 1950	221	964,830	12	42,313	233	1,007,143
1 July, 1950	199	973,112	8	37,401	207	1,010,513
1 October, 1950	156	639,163	8	51,084	164	690,247
1 January, 1951	144	685,344	9	39,927	153	725,271

Awaiting or Undergoing Repair

	British		Foreign		Total	
	No.	Tons Gross	No.	Tons Gross	No.	Tons Gross
1 January, 1950	134	744,481	12	47,172	146	791,653
1 April, 1950	156	767,757	9	30,040	165	797,797
1 July, 1950	155	825,303	4	21,304	159	846,607
1 October, 1950	116	516,438	6	50,122	122	566,560
1 January, 1951	108	602,319	6	30,857	114	634,176

Brazilian Iron Ore Exports

Exports of iron ore, through the port of Vitória, from the Itabira mines in the Rio Dôce Valley, during the year 1950 were 52 per cent higher than in 1949, according to the *Fortnightly Review* of the Bank of London and South America, Ltd. The total, which reached the unprecedented volume of nearly 722,000 tons, includes only haematite iron ore with a content of more than 68 per cent of iron. The U.S.A. bought 588,000 tons, and other purchasers were Canada, the Netherlands, Great Britain, Germany, and Belgium. Exports during 1951 are expected to reach 1,500,000 tons. The first shipment of Brazilian pig iron is on its way to the U.S.A. and a second is soon to follow, making a total of nearly 20,000 tons. The first Latin-American country to export pig-iron to the U.S.A. was Chile in December last.

The United States Lines has concluded an agreement for the lease of Pier 86, North River, Manhattan, which will be the home berth for their liner *United States*, scheduled to enter service early in 1952. The pier will handle all United States Lines' passenger traffic after this date.

Cargoes carried on the Great Lakes during 1950 totalled 177,950,248 net tons, compared with 151,697,287 tons in 1949. The peak year was 1948, when 185,612,490 tons were carried. Limestone shipments during the year constituted a record at 23,395 net tons, while iron ore cargoes reached 78,205,681 tons, second only to the peacetime peak of 82,937,192 tons in 1948. The movement of grain declined, totalling 9,324,647 tons as against 12,542,565 tons in 1949.

Cargo handled at Middlesbrough dock last year totalled 758,356 tons, an increase of 123,000 tons on 1949. Exports increased by nearly 127,000 tons to 598,178 tons, but imports declined to 160,173 (164,234 tons in 1949). A total of 730 vessels was dealt with during the year, there having been a marked improvement in the turnround of vessels. The largest increase in commodities handled was that of iron and steel manufactures, which at 293,757 tons, is nearly 130,000 tons higher than the previous year.

French Inland Waterways

Modernisation of Canals Urged

By a Special Correspondent

Goods carried over the French inland waterways in 1950 totalled 42,454,081 metric tons. This was an increase of about 5 per cent on the figure of 40,089,493 tons attained in the previous year. On the other hand, the performance, as expressed in ton-kilometres, rose by some 7½ per cent to 6,729,812,671 ton-kilometres in 1950. In 1938, the performance had been 8,256,000,000 ton-kilometres. These figures denote that progress attained since the war has still to make considerable headway to reach prewar levels. In this connection, French inland shipping interests have repeatedly voiced their apprehension and discontent as to the state of canals and locks, claiming a considerable increase in the funds granted for the maintenance and development of the waterways, or, alternatively, the granting of adequate subsidies which would enable the owners of inland craft to meet competition successfully.

On the other hand, the reconstitution of the inland fleet has been making good progress. In 1938, the French inland fleet consisted of 12,640 craft, including 920 large barges on the Seine and Rhône, 10,180 barges of the standard type (measuring 126 ft. 3 in. by 16 ft. 4¾ in.), and 1,540 smaller craft for service in the second-class canals. The 12,640 craft were subdivided into 3,140 self-propelled boats, 3,500 iron and 6,000 wooden barges. The two latter categories to be towed. The reconstruction of the inland fleet had been entrusted by the French Government to a concern specially founded for this purpose in 1946, and known as the Société pour la Reconstruction due Parc Fluvial. By August, 1946, a building contract was entered into with the Société des Chantiers et Ateliers du Rhin, Strasbourg.

Mass Production of Barges

This Rhine shipbuilding yard has been associated with the Société des Forges de Strasbourg, an iron and steel firm not previously concerned with shipping or shipbuilding except through an order towards the end of the war for the mass supply of steel pontoons to enable the French forces to cross the Rhine into Germany. In this way, the Forges de Strasbourg learned something of the advantages of mass production methods in the building of watercraft. The Société des Chantiers et Ateliers du Rhin, in its turn, adopted these progressive methods. The contract referred to above was for 600 vessels. For 450 of these, prefabricated assemblies were to be obtained from the Société des Forges de Strasbourg, but it was not until March, 1949, that the first craft of the first series was launched. From May, 1949, onwards, one craft a day has been launched at Strasbourg. Each craft consists of five assemblies welded together.

Much of the French inland waterways system is badly in need of modernisation. The waterways total 5,977 miles, of which rivers account for 2,817 miles and canals for 3,160 miles. Of this system, some 620 miles consist of large waterways in which barges longer than 126 ft. 3 in. may easily operate, such as on the Seine between Paris and the sea, on the Saone and Rhône from the Mediterranean as far north as the mouth of the Doubs river, on the French section of the Rhine, on the Meuse downstream from Verdun, and on the estuaries of the Loire and Gironde. On these waterways barges of up to 393 ft. 7 in. length and 45 ft. 11¾ in. width may be seen. Furthermore, there are 3,615 miles (5,820 km.) of rivers and canals navigable only by barges having maximum dimensions of 126 ft. 3 in. length, 16 ft. 4¾ in. width and 5 ft. 10¾ in. draught. It is claimed that the depth of the waterways should be increased to enable the draught of the 126 ft. barges to be increased to 7 ft. 3 in. This would immediately increase the carrying capacity of the boats from 280 to 350 metric tons.

River Plate Pilotage

The latest report from J. E. Turner & Co. S.A., of Buenos Aires, states that the new regulations concerning pilotage have increased the tariff. In the River Plate zone, the basic draught for Punto Indio has been reduced from 23 ft. to 21 ft., which means that any ship arriving or sailing with a maximum draught of over 21 ft. now pays excess pilotage over this minimum. This reduction is difficult to reconcile, considering that the fleet of dredgers has been considerably augmented in recent years and there are now dredgers available that can keep a channel clear to no less than 60 ft.; and as the Canal Indio is in the main access channel to Buenos Aires, it was hoped that the basic depth would be increased rather than the reverse. In the port of Buenos Aires zone, the access channel is now counted as a section of the port, so that every ship pays for one more section.

About Aluminium... 1

INTRODUCTORY

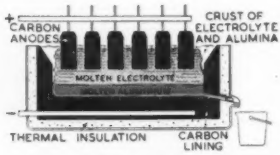
This is the first of a number of short factual reviews of those features of the metal aluminium that are relevant to its use as an engineering material. The series is intended primarily for students, to enable them to widen their acquaintance with an element that has grown, perhaps rather too quickly for the standard text books yet to have followed, to an industrial significance second only to that of steel. We hope that they may find the data worth keeping for reference when they meet aluminium, as they will ever more frequently do, in their future careers.

Extraction

Aluminium is the most abundant metal in the earth's crust. Its most useful natural form, however, is the hydrated oxides that largely compose the mineral bauxite. This does not respond to simple smelting methods, and the metal was not isolated until 1825. Thereafter, small amounts of aluminium were produced by reduction by sodium, but it remained a very costly metal. In 1886, however, a very much cheaper way of reducing aluminium oxide (alumina), by electrolysis, was discovered, and this process is the one now in use.

Briefly, the ore is first treated to produce pure alumina; this oxide is dissolved in molten cryolite and a heavy electric current is passed through the solution from carbon anodes, near the surface, to the carbon lining of the bath. The oxide is broken down electrolytically, the oxygen combining with the anodes to escape as carbon dioxide, and metallic aluminium sinks to the bottom, whence it is tapped from time to time. Little change takes place in the cryolite; the carbon anodes are consumed and have to be regularly replaced.

Four pounds of high-grade bauxite are needed to produce two of alumina, which will in turn yield one pound of aluminium of over 99 % purity. Roughly 10 kWh of electricity are consumed for each pound of metal obtained from the reduction cell; this makes cheap and plentiful power essential, and the world's main reduction plants are sited on specially built hydro-electric schemes.



Electrolytic Reduction Cell

Fabrication

Of the aluminium produced, more is marketed as sheet than in any other form. Sheet rolling is not basically different from that of most other metals, and similar equipment is used: a prepared cast ingot is passed through a succession of pairs of hard steel rolls and its thickness reduced step by step to that desired. It is first rolled hot, but the final reductions are made on the cold sheet to obtain a good finish and perhaps, by work hardening, a desired degree of hardness. The production of accurately-gauged, flawless sheet and strip demands very precise and elaborate equipment and much experience.

Equal in importance is the extrusion process, by which lengths of metal of constant cross-section, solid or hollow, are made. Very high pressures are used to force hot plastic aluminium out of a container through a steel die of the required shape. This process produces, in a single operation, sections that could be made in no other way. Aluminium is one of the few structural metals that can be extruded, and the variety of intricate sections possible encourages ingenious design in many products.

Seamless light-gauge tube is made by drawing down extruded thick-walled tube through hard steel dies. Rolled sections and rod are formed by passing a cast billet or heavy extruded bar through a series of shaped rolls; by drawing the rod through dies it is further reduced into wire. A principal use of rod and wire is for making rivets.

Although now accounting for a lesser volume of metal than sheet rolling or extrusion, casting and forging are practised on a large scale.

Casting was the earliest way of making things in aluminium, and was in use from the first days of the motor industry, which is still a major consumer in crankcases, pistons, and other engine parts. Sand moulds, or iron or steel "permanent" moulds (gravity dies), are used.

Forging is suitable for highly stressed but more simple parts, such as engine connecting rods or propeller blades. A piece of hot aluminium is simply hammered or pressed to shape between a pair of hard steel dies.

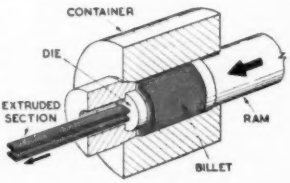
Why it is important to the engineer

The properties of aluminium are to be discussed in later articles of this series, but we should mention two of the characteristics that made aluminium worth developing, and that lie behind its wide acceptance as a primary structural material.

The first is well-known: that the specific gravity of the metal is low (2.70), about a third of that of steel. This gives it first place where lightness is sought in structures or mechanisms, for its strength, slight in the pure state, can by alloying and by mechanical and thermal treatment be raised to equal and surpass that of structural steel.

Not, perhaps, so widely appreciated is aluminium's power of resisting damaging attack by the atmosphere. This, probably as much as low weight, has promoted its use in building for the sake of long life and freedom from recurrent painting costs. Marine conditions are adequately withstood by suitable alloys, which are in use in many sea-going craft. Its reluctance to corrode, and the harmlessness of its salts, make the metal of value in the processing and packing of food.

In its short life, aluminium has become established as a material useful to most branches of engineering, indispensable to some.



The Extrusion Process

The further articles in this series will deal with specific aspects of the metal and its behaviour.

Monthly Light Alloys Section

ALUMINIUM IN SHIPS

A REPLY TO CRITICISMS BY "A SHIPYARD NAVAL ARCHITECT"

By E. C. B. CORLETT, M.A., Ph.D.

THE INTERESTING article published in THE SHIPPING WORLD of February 7 is of value to the aluminium industry in that it exposes the doubts and fears of at least the shipyard naval architect. There are flaws in several of the arguments put forward, as in most cases they are not based on the technical situation as it stands at the moment. The supply of basic ingot is undoubtedly a worry and it is most undesirable, in view of the present economic position, that we should have to pay dollars for a high proportion of our raw material. This difficulty is not insuperable, however, as there are large potential supplies of bauxite and water power in the sterling area, and in some cases these are in strategically desirable areas.

There is no reason why repair facilities should be hindered by difficulties in working the material, as, in fact, these do not exist and the working can be done with less elaborate plant requirements than are needed for steel. The supply position is open to debate; it must be remembered that the fabricating capacity of the aluminium industry is greater that it was in 1945, and it is reasonable to suppose that aircraft requirements will not be higher than in that year. In point of fact, the plant used for ship plate is, in part, different from that used for aircraft sheet and once the rolling blocks have been cast and hot rolled the two products do not overlap.

The Welding of Light Alloys

Of the technical criticisms, the first is one that has applied in the past, but overlooks the rapid progress made in the last two to three years. Inert gas-shielded welding has improved enormously and the latest developments (the Aircomatic process is described in this issue) place the welding of aluminium alloys in shipyards in a position potentially not inferior to that of mild steel. The apparatus in question does not require a special generator and uses a consumable electrode of the same composition as the material being welded. This is fed mechanically down the gun. Indeed, using steel wire in the apparatus shows that it is actually a slightly cheaper method of welding mild steel than using coated stick electrodes. The costs for aluminium welding are a fraction of ordinary argon arc welding and speeds are very much higher. There are strong reasons for believing that welds in N5 and N6 alloys are of virtually 100 per cent efficiency. Overhead welding is as easy as down-hand welding, no cooling of the torch nozzle is needed, and any thickness can be welded. "A Shipyard Naval Architect" must agree that such an apparatus changes out of all recognition the picture he paints. In the United States, where this process originates, the welding of aluminium is rapidly replacing riveting in spite of the fact that their ship plate light alloys, being heat treated, are not nearly as suitable for welding as ours in Britain. It is believed that a change to alloys of our type is already under way and this, of course, will reduce the complications of replacement in wartime.

Identification of Materials

The observations on the multiplicity of names and numbers are pertinent and sound. If all shipbuilders would use the BS/GE nomenclature, ignoring proprietary names, they would find identification simpler, especially as the British Standard names typify the material, thus; **N**S, **N**on heat treatable **S**heet, HE, *H*eat treatable *E*xtrusion. Lloyd's Register tentative requirements, however, have led to the evolving of 4 per cent magnesium-containing light plate which is rapidly becoming the standard shipbuilding plate in this country, and, as mentioned before, is being introduced in North America. It would not be too rash, perhaps, to predict that in, say, four years time "A Shipyard Naval Architect" could ask for "shipbuilding aluminium plate" and get as a standard article from any supplier a 4 per cent magnesium plate conforming with Lloyd's requirements and eminently suitable for high speed Aircomatic type welding.

The largest size of rivet that can be driven pneumatically depends on the driven point, and $\frac{3}{4}$ in. diameter cold driven rivets with a marine countersunk point can be handled quite easily by a heavy gun. Techniques exist whereby specially shaped $\frac{7}{8}$ in. diameter rivets can be driven cold pneumatically and at an economic speed, and indeed the Arvida Bridge employs such rivets almost exclusively. A 5 per cent magnesium alloy rivet of $\frac{7}{8}$ in. diameter can be driven hot, pneumatically, at 500 degrees centigrade in about eight seconds if a marine countersunk point is used, and all in all the riveting position is far from gloomy. The larger size of rivet can be handled hydraulically with ease, of course.

Aluminium castings are being used to an increasing extent to replace brass or bronze, and the fittings quoted by "A Shipyard Naval Architect" are very suitable applications. Windows have "vanished" at sea in the past, but the cause is well known. Normally, the casting alloys used for marine work are of very high reliability in these conditions but in some cases direct contact with copper (e.g. brass holding-down screws) and contamination of the metal during melting have altered the properties radically. It is vitally important that the recommended precautions covering both these points be watched, and if this is done complete satisfaction will result.

In view of the detailed comments published in THE SHIPPING WORLD of the results of the American Stateroom Fire Test (January 3, 1951), it is not proposed to go into this question in detail, but it can be said that it is very easy to deal with the problem by using existing methods of insulation, and "A Shipyard Naval Architect" can be assured that within the next six months or so complete and detailed solutions will be put before the shipbuilding industry based, of course, on official fire tests. The fire tests themselves are being carried out purely (a) to obtain Ministry approval and (b) to find the minimum desirable thickness of heat insulation. This whole question was solved in America as much as ten years ago by extensive experiment and the cost of the fireproofing is very little, if any, more than the normal fireproofing and joiner work in a steel superstructure.

To conclude these brief comments on the position of aluminium in shipbuilding, the author would say that he regards the present price of aluminium to be by far the most important factor limiting its use. The necessity to buy aluminium from the dollar areas with our depreciated currency is, to a large extent, responsible for this situation, and as in many cases the economics of using aluminium are marginal, it is clear that they are sensitive to fairly small percentage price increases. It is to be hoped that this is a temporary state of affairs, and indeed recent statements in the Press encourage this hope.

Aluminium in Ships

To the editor of THE SHIPPING WORLD.

SIR,—In the article 'Aluminium in Ships' (February 7, p. 157) caution in extending the marine uses of aluminium is advised partly on grounds of possible supply difficulties in wartime. Experience of restricted aluminium supplies in 1939-40 should not be used as a guide to the supply position today. Ingot supplies and fabricating capacity were then very limited and it was essential that the available output should be reserved almost exclusively to meet the aircraft programme. Thus important developments in marine uses were arrested and the aluminium industry lost six valuable years in its marine development programme. Capacity for rolled products (plate, sheet and strip), in terms of tonnage output increased between 1939 and the peak year of 1943 as follows:—

1939	38,000 tons
1940	48,000 ,,
1941	60,000 ,,
1942	85,000 ,,
1943	104,000 ,,

Today output of rolled products is of the order of 125,000 tons a year, while, given unrestricted metal supplies, actual capacity is probably nearly 175,000 tons. It is difficult to quote comparable figures for extrusions in terms of tonnage as the type of extrusion required for war purposes varies from that for the normal civil markets, but it can be assumed that extrusion capacity in terms of war requirements is more than adequate to meet a war programme. The significance of these figures is that an output of say, 100,000 tons of rolled products was adequate to build and maintain the aircraft programme at war peak, including a high proportion of heavy bombers. In the event of a further war, fabricating capacity would probably greatly exceed requirements for aircraft and the surplus capacity could be assumed to be available to meet other service requirements.

(*continued on page* 244)

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THE WELDING OF ALUMINIUM

USE OF THE "AIRCOMATIC" PROCESS DEVELOPED IN THE U.S.A.

SINCE the beginning of the Second World War, British shipbuilding has changed over very largely from a riveted ship technique to the extensive use of welding, in some instances up to the limit favoured by the classification societies. It has been natural, therefore, for many critics of the use of aluminium alloys in shipbuilding to stress the difficulties which have undoubtedly existed in welding such light metals. Obviously it would be advantageous, to put it no higher, if the substitution of aluminium for steel could be affected within the technique of welded construction, as the shipyards are now laid out for such work, welders are available, and, perhaps even more important, young men are proving reluctant to become apprentice riveters, considering it to be, rightly or wrongly, a dying trade.

It must be admitted that experience with the welding of the thicker plates and sections in light alloys in this country has not been without disappointments, though the use of the "Argonarc" process has produced satisfactory results, while at least one method of welding studs to aluminium alloys has been eminently successful. From the information given in this article, based on a paper given by A. Muller, G. J. Gibson and E. H. Roper before the American Society of Naval Architects and Marine Engineers in 1949, it is clear, however, that the solution may lie in this American process, which has not yet been operated on a commercial scale in Britain. A correspondent who recently inspected applications of this process at the Air Reduction Sales Company's works in America has reported most highly of the technique and plant used. British development of the process seems to be a pressing need if we are to retain our technological lead in shipbuilding.

THE AIRCOMATIC process may be defined as inert-gas-shielded metal-arc welding. A consuming electrode is used, which differentiates this process in one respect from the inert-gas-shielded welding process which uses non-consuming tungsten electrodes. Fundamentally, the tungsten arc process simply provides a protected source of heat for fusing metals. Filler metal may or may not be added to the arc as an independent operation. The Aircomatic process is characterised by an inert-gas-shielded arc between the workpiece and a consumable electrode through which metal is transferred to the workpiece where it becomes part of the joint. The transfer of material through the protected arc column increases the efficiency of heat input to the workpiece over that obtained in the tungsten arc process. This increase in efficiency is partially the result of the heat content of the superheated metal passing through the arc. The resultant high intensity heat source permits very rapid welding.

Practical means for applying the Aircomatic process have been developed; one method employs a manually manipulated welding gun; another method uses an automatic head. Both methods use a continuously fed bare wire in coil form for the electrode. The inert monatomic gases are suitable for shielding; both helium and argon and mixtures of these gases can be used. The arc is shielded by a stream of gas which issues from a nozzle through which the electrode passes. The nozzle is positioned so that the gas stream shields the arc but does not impair visibility. The wire reel, feed motor and electrical controls are contained in the frame assembly. Wire and gases are carried to the gun through a flexible hose. The manual gun, which does not require cooling arrangements, employs a small flexible electrode wire having a maximum diameter of 3/32 in. With this arrangement the gun can be manipulated to weld in all positions. The distinguishing feature of this head is the gas nozzle assembly. The automatic head can be used only for flat or horizontal fillet welding. This apparatus can be fixed in position or mounted on a travel carriage.

A description of the characteristics of this inert-gas-shielded metal arc welding process contributes to the knowledge of fundamental arc-welding phenomena. This welding method is basically one of the simplest of all metal-arc processes. Bare filler wire is melted in a completely inert atmosphere and is efficiently transferred to the joint, where the arc provides sufficient heat to fuse the plate surfaces to make an effective junction. In all other metal-arc welding processes the metallurgy and arc phenomena are complicated by slag-metal and gas-metal reactions at high temperatures from the time the metal melts off the end of the electrode until it freezes in the joint. Arc action is complicated by dissociation and subsequent recombination of polyatomic gases present in the arc. No fluxes are required with the inert-gas-shielded arc because the electrical cleaning action associated with reverse polarity welding current usually employed for this process effectively removes the surface oxide film from the joint. Metal transfer in the inert-gas-shielded metal-arc is very efficient. Chemical analyses of the electrode wire and deposited pads of undiluted weld metal are practically identical for all the common metals and alloys.

TABLE I.—Comparative cost data for tungsten electrode and "Aircomatic" welding of one type of container

Note—*The gases used are not those normally used in Britain, but afford a useful comparison. The container is used on a dumping truck and is constructed of $\frac{1}{8}$ in. material.*

Item	Per container: Tungsten Arc	Aircomatic
Helium cu. ft.	—	140
Argon cu. ft.	476	14
Fitting time, man hours	8	3
Welding time, man hours	30	7*
Welding cost, total†	$107	$37
Welding cost per linear foot of weld	$1.07	$.37
Costs saving per linear foot	—	$.70

* Work factor 50% of time compared with 33% of time for tungsten arc gases consumed only while actually welding.

† Includes gas, wire, rod, current, fitting time, welding time, etc. It is to be noted that as the thickness of material increases the cost of Aircomatic welding decreases relative to tungsten arc.

TABLE II.—Comparative equivalent British materials

American Alloy	Type	BSI/GE
2S	99% pure	—
3S		N3
4S	N3 + 1% magnesium	—
43S	5% silicon	—
52S		N4
61S		H10 + 0.25% copper

The most impressive feature of this inert-gas-shielded metal-arc process is the mechanical transfer of metal from the electrode to the weld. The principal requirement for this desirable type of metal transfer is high electrode current density. At a certain minimum current density which varies with both electrode size and material, transfer through the arc changes from very large globular drops which fall off the end of the electrode to a spray of extremely fine droplets which is projected from the end of the electrode in the direction in which the electrode is pointed. At this stage the arc changes from a fluttering erratic discharge with wandering cathode spot to a steady quiet column. This arc column has a well-defined narrow incandescent cone-shaped core within which the metal transfers. There is a complete absence of spatter particles, which is another desirable characteristic of the process for some materials.

The projected metal transfer which occurs in this process makes vertical and overhead welding possible. The mechanism of metal transfer for overhead welding has been extensively discussed in welding literature. The accepted explanation has been that expansion of gases at the tip of an electrode has provided the primary force to project metal across the arc, and that overhead welding with killed steel and "gas-free" core wires is very difficult or impossible without this phenomenon. However, with this process overhead welding is easily effected with aluminium, killed steel, stainless steel and other essentially gas-free metals.

The problem of lack of weld penetration which was noted in early investigations has been solved with the development of this process. Even in the low range of welding currents the use of high-current density establishes a stable-arc column with a well-defined cathode spot on the work piece so that the work is always fused where metal is deposited. This particular property permits the making of fully fused small fillet welds in relatively heavy material and the building-up of butt welds in narrow grooves. The amount of penetration for a given current can be controlled by arc length and the choice of shielding gas. At the same current and arc length, arc voltage is higher with helium shielding than with argon and the resulting increased energy with helium produces deeper penetration. This has advantages for welding high conductivity metals such as aluminium and for making small welds in other metals. Argon has advantages in that the arc is usually smoother with less spatter and is more desirable for welding where minimum penetration is required. The presence of a crater under

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TABLE – III

PROCEDURES AND SHEAR STRENGTHS OF FILLET WELDS MADE WITH THE AIRCOMATIC GUN

PLATE THICK IN	WELD POSITION	FILLET SIZE IN	WELD CURRENT AMPS	HELIUM FLOW CFH	WELD SPEED 100 % ARC TIME IN/MIN	WELD SPEED 100 % ARC TIME FT/HR	BREAKING LOAD LBS/IN AS WELDED	BREAKING LOAD LBS/IN HEAT TREATED	SHEAR STRENGTH LBS/IN² AS WELDED	SHEAR STRENGTH LBS/IN² HEAT TREATED
61S-T6	HORIZ	1/4	170	90	21	108	3080	3680	18 300	23 000
							3300	4340	22 000	24 400
							3490	5000	22 000	28 200
		1/4	190	80	32	170	2740	4040	19 600	22 600
							2580	4050	17 100	23 400
							2570	4140	17 300	26 000
	VERT	1/4	160	90	24	120	2640	3870	17 600	21 800
							3480	4180	20 000	26 200
							2670	4180	18 000	28 100
	OVER HEAD	1/4	170	80	26	130	3000	4330	21 600	23 000
							2670	3840	19 200	24 800
							2790	4020	20 000	23 900
1" 35 F	FLAT	5/16	350	75	19	90	5080		19 300	
							5440		19 000	
							5500		19 300	

1/4" 43 S WIRE USED FOR 61 S T 6 SPECIMENS.
" 28 " " " 35 " "
HEAT TREATMENT AFTER WELDING FOR 61 S SPECIMENS- SOLUTION TREATED AT 970°F - WATER QUENCHED - AGED 8 HOURS AT 350°F

the arc is not necessary for obtaining adequate penetration with this process.

Most of the characteristics of Aircomatic welding which have been described pertain to the operation of the manual gun, in which they are used to maximum advantage. The same principles may also be used for mechanically controlled welding operations where the gun or its equivalent are fixed in position. However, for applications requiring 400 amps. or more and for wire sizes greater than 3/32 in. a conventional type of automatic head is preferred. Since welding with the automatic head is limited to the flat position, it is not essential to employ current densities that will give projected metal or spray transfer, although this is usually desirable.

The Aircomatic process was first applied to the welding of aluminium. The simple strain-hardening alloys such as 2S, 3S, 4S and 52S, as well as the magnesium silicide type age hardening alloy, 61S, can be welded. Other high strength precipitation hardening alloys containing copper and zinc are not considered readily weldable and have not yet been investigated. The electrode wire compositions available for welding are commercially pure aluminium, 2S, and 5 per cent silicon alloy, 43S. The commercially pure aluminium wire is used for welding the 2S, 3S and 4S alloys and the higher strength 5 per cent silicon wire is used for the higher strength alloys. Aluminium welding with this process is simple and straightforward. Chemical analyses of wire and undiluted weld pad deposits are practically identical.

Another characteristic of this process which is advantageous from a metallurgical standpoint is the rapid rate at which metal is deposited. The intense heating and rapid travel speed results in a narrower heat-affected region than is obtained with the tungsten arc process.

The complete elimination of hydrogen and hydrogen containing compounds from the arc is extremely difficult. Possible sources of hydrogen include the shielding gas, hydrocarbons on the wire or base metal, and absorbed water vapour on the oxide film of both wire and plate. Tests have shown that the purity of argon and helium now commercially available for welding does not contribute to porosity. Complete degreasing of the wire prior to welding results in a marked improvement in weld porosity and the use of cleaned wire stripped of its oxide film still further reduces porosity.

The most effective method for control of weld porosity is by using a welding procedure and technique which promotes the escape of the gas before the surface of the metal freezes. In general this technique involves agitating the weld puddle to promote the elimination of gas bubbles. With proper technique and clean wire that has been protected from excessive atmospheric exposure, sound welds can be readily made in the flat position which are acceptable under pressure vessel standards. Elimination of porosity in vertical and overhead welding is more difficult because welding techniques are limited to those resulting in quick freezing of the weld metal so that it will not run out of the joint. Fortunately the welding procedures found best for eliminating porosity in the flat and horizontal position are not detrimental to weld appearance or production rates.

At present the range of the Aircomatic gun for welding aluminium extends from a minimum of 3/16 in. to the maximum thickness available. All types of commonly used butt and fillet joints can be made and the method is particularly adapted for welding in restricted regions which are impossible to reach with the tungsten arc process. Welds can be made in all positions—flat, horizontal, vertical and overhead. The gun is easy to operate and less skill is required to make acceptable welds in all positions than with coated-steel electrodes.

The process is particularly advantageous for making fillet welds. Attractive appearing fillets with good fusion and strength can readily be made at remarkably fast speeds. Fillet welds can be made at a speed of 4 ft. per minute, but since a welder can usually make only about 2 ft. of joining without stopping and moving, such high speeds lose some of their advantage and it has been found desirable to limit manual welding speeds to 20 to 24 in. per minute.

The mechanical properties of aluminium welds made with the manual gun are excellent. Shear strengths for fillet welds are indicated by the tests shown in Table III. The test specimens were cut from long double-tee test plates. The two opposite legs of the tees were not always in exact alignment, being somewhat offset as well as bent, so that the tests may not represent the maximum shear strengths obtainable with standard specimens. The procedure data in the tabulation include actual welding speeds at which these fillets were made in the flat, horizontal, vertical and overhead positions. The heat treatment of the 61S-T6 plate specimens increased the shear strengths of the welds considerably, indicating considerable alloying with the plate. All of the specimens failed by shearing through the throat of the welds. The shear strength values were calculated on the measured fractured areas of the welds below the root of the fillet. The penetration in this weld extends considerably below the root of the fillet. The shear strength obtained in this weld made with 2S is proportionately greater than the strengths of the smaller specimens welded with 43S wire, based on the respective tensile strengths of these materials. This is not the effect of penetration but of better alignment of the specimens made of the heavier plate material. The weld fractures were all acceptably

TABLE – IV

PROCEDURES AND MECHANICAL PROPERTIES OF ALUMINUM BUTT WELDS MADE WITH AIRCOMATIC GUN

PLATE MATERIAL	JOINT & BEAD SKETCH	WIRE DIA	GAS FLOW CFH	PASS	CURRENT AMPS	ARC VOLTAGE	*SPEED OF JOINT IN / MIN	TENSILE STRENGTH PSI	TENSILE FRACTURE
1/8" 35-F		1/16" 2S	ARGON 30	1	190	19	26	14 875	PLATE
1/8" 2S-F		1/16" 2S	HELIUM 30	1-2	255	30	11	13 100 13 100	PLATE
1" 3S-F	80°	1/16" 2S	HELIUM 75	1 2 3-4	315 330 305	28 34 34	37	18 125 19 250	WELD WELD
1/8" 61S-T6		1/16" 43S	HELIUM 50	1-2	245	30	12	28 600 29 300 43 800+ 44 500+	PLATE
1/8" 61S-T6	30°	1/16" 43S	HELIUM 75	1 2	325 330	31 31	43	39 200 25 900 42 000+ 38 400+	PLATE PLATE WELD WELD

* SPEEDS ARE COMPOSITE FOR ALL BEADS AT 100 % ARC TIME - ALL WELDS WERE MADE WITHOUT CHIPPING NOTES - BILLO REINFORCEMENT REMOVED ON TENSILE SPECIMENS
+ HEAT TREATMENT - SOLUTION TREATED AT 970°F - WATER QUENCHED - AGED 8 HOURS AT 350° F

TABLE – V

WELD PROCEDURES FOR ALUMINUM WITH THE AIRCOMATIC HEAD

PLATE	JOINT & BEAD SKETCH	WIRE DIA	HELIUM FLOW CFH	PASS	CURRENT AMPS	ARC VOLTS	JOINT SPEED IN / MIN.
1/8"	90° COPPER	1/16"	75	1	420	30	18
3/8"	90°	1/16"	75	1-2	385	30	8
1"	90° COPPER	1/16"	120	1	650	34	9
1 1/2"	90°	1/16"	100	1-2	570	33	4

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TABLE – VI

MECHANICAL PROPERTIES OF ALUMINUM WELDS MADE WITH THE AIRCOMATIC HEAD

TEST SPECIMEN	WIRE	PLATE	TENSILE STRENGTH PSI	REDUCTION IN AREA %	ELONGATION %	REMARKS
ALL WELD METAL (.505)	2S	¼" 3S	17 900	3.6	25	
	43S		22 400	9.6	8.4	
REDUCED SECTION TENSILE	2S	½" 2S	13 100			FRACTURE IN PLATE
		¼" 3S-T	15 030			
	43S	½" 61S-T6	27 500			
			45 350	HEAT TREATED		
		½" 3S-F	18 870			FRACTURE IN WELD
			27 700	AT −320 °F		
FREE BEND TEST	2S	¼" 3S-F			44	180° BEND ANGLE
					32	130°
		½" 3S-F			30	
			AT −320° F		20	
GUIDED S-DE BEND TEST	2S	½" 2S				180° NO DEFECTS
		¼" 3S-F				
		½" 3S-F				
			AT −320° F			

sound and comparable to typical fractures of structural steel welds made with coated electrodes.

The mechanical properties of butt joints made in the flat position with this process are shown in Table IV, in which the welding procedure used for these joints is also presented. These are representative joints in which full advantage of the deep penetration of the process is taken for maximum welding speeds and to obtain a heat-treatable weld metal with 43S wire. The speeds at which these joints were welded are very high when compared to other manual processes. The tensile strengths of these welds are comparable to the strengths of the plate. Heat treated welds in 61S-T6 plate developed practically the full strength of the unwelded heat-treated plate material. The ductility of 2S welds made in 2S and 3S plate is sufficient to permit the use of the standard guided bend test.

The field of application of the Aircomatic head for welding aluminium alloys is similar to that of other automatic processes and is principally for quantity production jobs involving heavy plate fabrication in the flat position where high welding rates are advantageous. The current range for welding aluminium with the head is from 300 to 650 amps. The head can be used for welding butt joints in material ⅜ in. and greater in thickness. Horizontal fillets can be made in heavy material with difficulty and it is usually more practical to use the manual gun for this purpose. The head uses bare wire in coil form 3/32 to 3/16 in. in diameter. The most practical size is ⅛ in., and this size can be used over with full current range of the head. Metal transfer in the low current range tends to be globular. This type of transfer is practical for flat welding with the head since this equipment controls the rate of feed by arc voltage.

The welding procedure used for a few typical joints made with the head are tabulated in Table V. The joint designs are such as to take full advantage of the deep penetration characteristics of the process. No root chipping of these joints is required. The welding grooves are designed to permit the required penetration and provide a space for the deposited metal so that it does not pile up as excess reinforcement. It is usually preferable to weld the joints from both sides, but completely fused welds can be made from one side providing suitable backing is used. It is quite often advantageous to weld one side of a joint in heavy plate with the gun, providing not more than ¼ in. penetration is required.

Fully automatic control of the process with the head makes the production of sound welds a relatively simple matter. The high rate of heat input to the welds which is associated with the high current and slower travel speeds used results in a large molten weld puddle which solidifies relatively slowly, thereby giving any gas in the weld sufficient chance to escape. The vigorous arc action of high welding currents replaces the oscillation technique usually required with the gun for producing sound welds, so that a straight steady forward travel of the electrode can be used. The mechanical properties of automatic welds are given in Table VI.

TABLE VII.—Description of welds in magnesium aluminium alloys

(a) Type of material : 5% magnesium, i.e., NP6.
Thickness : 1 in.
Rod : Type of material : N5, diameter ⅛ in.
Number of runs : 3 at 350 amps and 33 volts.
Speed per run : 16 in. per minute, double V butt weld.
Weld properties : .505 in. all weld metal specimen. Tensile strength, 16.7 tons/sq. in.
Reduced section specimen : Tensile strength, 17.1 tons/sq. in.
Elongation on 2 in. of all weld metal specimen : 24.5%.
Free bend : Elongation on 1 in., 29%.
Angle of failure : 90 deg.

(b) Type of material : 3½% magnesium, i.e. NP5 (properties do not correspond with those of British material as this alloy is still under development in America).
Thickness : 1 in.
Rod and welding procedure : As with the NP6 material.
Weld properties : .505 in. all weld metal specimen. Tensile strength 14.4 tons/sq. in.
Reduced section specimen : Tensile strength, 14.1 tons/sq. in.
Elongation on 2 in. for all weld metal specimen: 24.5%.
Free bend : Elongation 22%.
Angle of failure : 121 deg.

ALUMINIUM IN SHIPS

(*Continued from page 241*)

At least we can dismiss the bogey of limited fabricating capacity which was so serious a problem in 1939.

The availability of such capacity for purposes other than the aircraft programme would, as your contributor points out, be dependent on virgin metal supplies. Home production of virgin aluminium ingot is 30,000 tons a year and this represents less than 20 per cent of the present level of consumption. The balance is imported from Canada. It is impossible to forecast Government policy on the supply of raw materials from abroad under war conditions, but the difficulty of maintaining supplies by sea would be obvious and in fact applies to the whole range of the country's requirements from food to war materials and particularly to metals. At the present level of consumption, marine applications for war purposes would not appear to represent a serious addition to the requirements for an aircraft programme. If such marine applications are justified on grounds of improved performance then it would appear to be unsound to abandon them now on the assumption that virgin metal might not be available. In the meantime it is the policy of the aluminium industry to press forward with marine developments in the confident belief that there is a sound economic case for the extended use of aluminium in shipbuilding.

In arguing that aluminium presents problems in the maintenance of repair facilities under war conditions your contributor appears to be on less definite ground. Again we must refer to the aircraft programme in the last war when widely dispersed operational aircraft fleets were maintained in service throughout the world. In fact it can be stated that the cost and difficulty of transporting aluminium for repair purposes abroad is considerably less than for the transport of equivalent quantities of steel. Further it is pointed out that the use of aluminium should not present any difficulties through workability and that one of the main reasons for the extending use of the metal in a variety of industrial applications is its ease of working. The transition from steel to aluminium in superstructures is probably as fundamental a development as the transition from riveted to welded ships. It would be a retrograde step to argue that a development of this character should be stopped because of theoretical strategic problems particularly where there is no inherent shortage of the metal.—Yours, etc.

C. G. McAuliffe,
(The British Aluminium Co., Ltd.)

45 Berkeley Square,
London, W.1.
February 26, 1951.

To the Editor of THE SHIPPING WORLD.

SIR,—In your issue of February 7 you print an article discussing aluminium in shipyards. The technical points can best be discussed by those qualified to do so, but I would like to comment on the supply of the ingot metal.

This comes largely from North America and the failure on the part of the Government to ensure a strategic supply, independent of North America, is only one more of the current examples of ineptitude and *lack* of planning apparent in our leadership. A sum equivalent to that wasted on the groundnut scheme would have altered the whole aspect of the situation if spent on aluminium reduction plant. Maybe it is not too late to expect that something can still be done. Yours, etc.—"*Per Absurdum non Reductus.*"

February 19, 1951.

KING George's Fund for Sailors has received £500 from the Union-Castle Mail Steamship Co., Ltd., being a donation from the collections taken on board the company's ships during the last six months of 1950.

Cut out for the sea

DURALUMIN 'H'

REGD. TRADE MARK

They need to be sturdy, the men who sail the seas—and the materials used to construct their ships must be tough and reliable too.

In choosing "Duralumin H" from the comprehensive range of alloys manufactured by James Booth & Company Limited, shipbuilders can be assured that they are dealing with a reliable material particularly suited to marine conditions.

This particular alloy must not be confused with some others in the "Duralumin" range, which contain different alloying elements. These have their own special merits for certain applications, but not for ship-building.

"Duralumin H" has been fully proved in use; it resists corrosion, is non-magnetic and discourages marine growths. Its use saves weight and power, and reduces maintenance costs.

Our Development Department will gladly give full information entirely without obligation.

JAMES BOOTH & COMPANY LTD. BOOTH **ARGYLE ST. WORKS · BIRMINGHAM · 7**

Monthly Light Alloys Section

The Survey Vessel "Ain-al-Bahr"

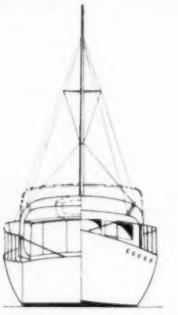
A Light Alloy Vessel Built to New Principles of Construction

REFERENCE HAS been made in several past issues of THE SHIPPING WORLD to the system of hull construction evolved by Grimston Astor, Ltd., of Bideford, using aluminium alloys. As will be recalled, each side of the vessel is flexed into the finished shape from an original flat sheet of aluminium alloy, the longitudinal framing being riveted in place before the plates are curved. Several interesting small craft have been built by the firm to these new patented principles, the latest and largest yet built being the twin-screw survey vessel *Ain-al-Bahr*, which underwent successful trials some weeks ago. Of considerable technical interest, this craft is designed to have an endurance of 1,500 miles carrying food and water for three weeks for a crew of 15. Built for surveying estuaries in East Pakistan, the essential characteristics of the launch are shallow draught and habitability. Both these aspects are helped by the light structural weight achieved by the patented constructional method developed by the builders. In this connection, it is of interest to compare the *Ain-al-Bahr* with a companion launch being built of teak by a local yard in Pakistan. Information, which it is understood is reliable, has been obtained for this launch.

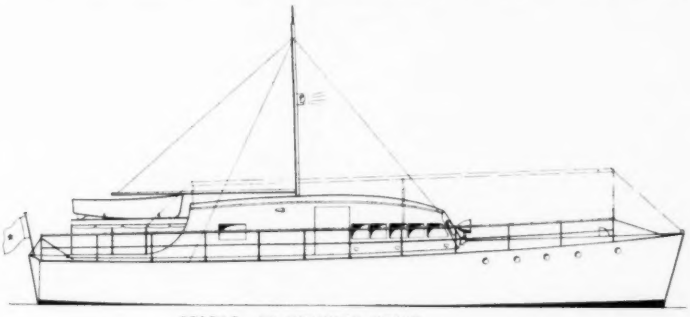
SPECIFIED REQUIREMENTS APPLICABLE TO BOTH SURVEY LAUNCHES

Endurance		1,500 miles
Fresh water supply		600 gallons
Speed		12 knots
	"Ain-al-Bahr" (aluminium)	*Teak Launch*
Total power	Less than 130 b.p.h.	260 b.h.p.
Displacement	11 tons	70/75 tons
Draught	2 ft. 9 in.	4 ft. 6 in.

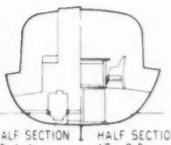
It is to be noted that the increased fuel capacity necessary



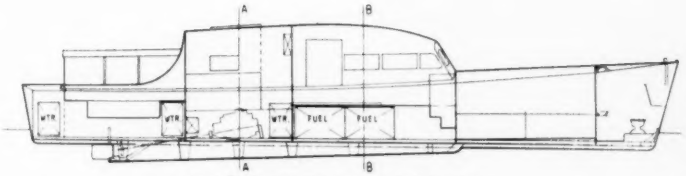
HALF VIEW FROM AFTSIDE HALF VIEW FROM FORESIDE



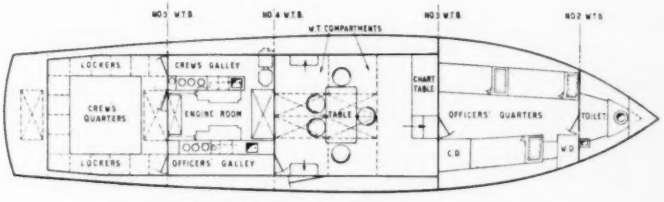
PROFILE AT CRUISING SPEED



HALF SECTION AT A-A HALF SECTION AT B-B



SECTION THROUGH CENTRE OF LAUNCH



NO.2 & 3 BLKS. WATERTIGHT TO 6" ABOVE W.L.
NO.4 & 5 " " " 3' 6" FLOOR LEVEL

ACCOMMODATION PLAN

in the teak launch, together with the increased machinery space requirements, must reduce materially the space available for the crew. The *Ain-al-Bahr* is built to Ministry of Transport requirements, yet in spite of her light construction easily passed the strength test which is required of the strongest lifeboats, which have to be hoisted by their ends with more than full load. The sea-keeping qualities of the *Ain-al-Bahr* promise to be good and were tested fully during the trials in the rough water on Bideford Bar. Similar launches of the same generic type have shown up well in this respect and are in service as Customs patrols, etc., with several foreign Governments.

Aluminium construction shows up particularly well in tropical service—the rapid deterioration of steel and wood hulls placing these in a relatively unfavourable position; Teredo worm affects wooden craft, and rapid drying after wetting results in rusting of steel craft at a rate which entails a large annual expenditure on maintenance. Under these conditions a higher first cost would be allowable for an aluminium boat, but one of the advantages of the method of construction used for the *Ain-al-Bahr* is that first cost is actually considerably less than that of steel or wooden construction.

PRINCIPAL PARTICULARS OF THE "AIN-AL-BAHR"

Length o.a.	60 ft.
Beam, moulded (approx.)	14 ft.
Draught over propeller and skegs	2 ft. 9 in.
Displacement	11 tons
Load B.M.	8.15 ft.
Materials of construction	Shet BA. 27-½ Hard Sections BA. 27 Decking BA. 25-W Positive Grip Plate.
Trial speed on measured half-mile	13.46 Knots.

These materials have been supplied by the British Aluminium Co., Ltd., who have cooperated with Grimston Astor, Ltd., over certain technical aspects, including calculations, and are joint sponsors of a film which is being made of the trials. This film will illustrate to a wider appreciation abroad the advantages both of the method of construction and of the materials.

ROUND THE SHIPYARDS

Work in Progress on the South Coast

By THE SHIPPING WORLD'S Own Correspondent

AS REGARDS new construction at South Coast shipbuilding yards, no new orders have been reported during the past few weeks. Work in hand on ships on the stocks and fitting-out has made steady progress. Preliminaries in connection with the 5,000-tons hull that John I. Thornycroft & Co., Ltd., are building for Fred Olsen & Company, Oslo, under sub-contract to Akers Mek. Verksted, Oslo, have gone forward, and the destroyer *Duchess* is approaching the launching stage. The 600-tons floating dock that the same firm is building for the Peruvian Government is well advanced, and work has continued on a 650-tons salvage vessel for the Mersey Docks & Harbour Board.

The firm has recently completed two heavy-type twin-screw motor pilot launches for the Karachi Port Trust, the *Sameereh* and *Umaima*, and the first named ran her trials in the Solent at the end of last month. The launches are of about 20 tons gross each, and constructed of Rangoon teak with hulls metal sheathed. Each is fitted with two sets of Thornycroft 6-cylinder diesel engines of 130 b.h.p. per engine, giving them a speed of about 10 knots. As they are designed to perform the dual rôle of pilot cutters and tugs, towing bars have been fitted for the latter purpose, and the mainmast, just forward of the bridge, has a high topmast which can be housed to avoid damage to the mast when going alongside ships in a swell. Rendel, Palmer & Tritton, the consulting engineers, have given the fullest consideration to their equipment and fitments generally to meet the tropical conditions of the service in which they will be employed.

Tonnage at present in course of construction at the shipyard of J. Samuel White & Co., Ltd., Cowes, I.O.W., includes H.M. destroyer *Dainty*, the 3,000-tons gross refrigerated ship *Kadoura* which the firm is building for the Chargeurs Reunis, Paris, a 110-tons motor cargo vessel for the Island Transport Company, a 285-tons lightship for the Calcutta Port Trust, and 20 motor lifeboats, representing the balance of an order from the R.N.L.I. John Morris & Co., Ltd., Gosport, have gone forward with the construction of two twin-screw tunnel stern tugs of about 590 tons each, and two twin-screw tunnel stern passenger craft of just over 200 tons each. Along the coast to the westward Philip & Son, Ltd., Dartmouth, have had eleven ships on the stocks or at the fitting-out berths, ranging from a 25-tons motor launch for the Crown Agents for the Colonies to a harbour salvage and water vessel of 220 tons for the Cia. Sud-Americana de Vapores, Valparaiso, and two 450-tons passenger ferries for the Wallasey Corporation.

Refitting and Shiprepair Work

The shiprepairs branch of Harland & Wolff, Ltd., at Southampton Docks, had a noteworthy emergency repair job in the case of the machinery breakdown of the United States Lines' flagship *America*, when she developed a fracture in the tapered coupling end of the journal, or shaft, of the starboard low-pressure turbine rotor. The fracture revealed itself just after the vessel had sailed from the Ocean Terminal at Southampton Docks, and before the tugs had left her. She was towed back to the docks where the rotor was opened up for inspection, and on the subsequent examination of the port low-pressure rotor the journal was found to be cracked to such an extent that it might have fractured similarly at any time. Substantial temporary repairs were effected by Harland & Wolff's, with men working night and day, and through the week-end following the breakdown. Surveyors of the Ministry of Transport, American Salvage, American Bureau of Shipping and Salvage Association were in attendance, and the *America* was due to run full power trials off the Isle of Wight after the completion of the repairs at the end of February. Another emergency job which Harland & Wolff's attended to in the last week of February was on the Liverpool steamer *Perdita*, which developed a hole in the front end plate of her boiler, under the furnace, when in mid-Channel, and was towed in to Southampton by the tug-tender *Calshot*.

Thornycroft's have had in hand H.M. ships *Caprice*, *Matchless*, *Fancy* and *Onyx*, and H.M. Pakistan ship *Jhelum*, all for complete refit, and H.M. troopships *Dilwara*, *Empire Orwell*, and H.M. transport *Charlton Star* for general repairs. J. Samuel White & Co., Ltd., are at completion stage with the conversion of H.M.S. *Falmouth* to an R.N.V.R. drillship, and the refit of the Egyptian frigate *Ibrahim* has proceeded, together with the complete refit of H.M. fleet minesweeper *Ready*. Camper & Nicholson's, at Northam, have been engaged on the refit and drydocking of the salvage vessel *Salvestor*, and Silley Cox & Co., Ltd., of Falmouth, have had in for repairs, drydocking, or other requirements, the tankers *British Dragoon*, *British Commodore*, *British Might* and, among other vessels, the *Fort Frederic*.

A RECORD total of 1,300,000 tons of goods was handled by the Port of Haifa during 1950, compared with 900,000 tons in 1949.

THE Matinolich Ship Repair Company, of San Francisco, has leased the Port of Oakland and Navy facilities in Fifth Avenue, Oakland, for use as a Government shiprepair base. To allow for immediate operations the company has acquired the use of a U.S. Navy 2,800-tons floating dock for five years.

THE total number of ships for which Decca marine radar has now been ordered exceeds 750, the ships being owned by 173 separate companies. Important contracts recently received by Decca include one for 13 ships to be fitted for the Houlder Brothers group and another 7 colliers to be fitted for the South Eastern Gas Board. Decca radar has also been adopted by the Nautical College, Hull, for the radar observers' course.

DANISH SHIPPING AND SHIPBUILDING

PROTEST AGAINST CHILEAN-UNITED STATES DISCRIMINATORY AGREEMENT

By THE SHIPPING WORLD'S Own Correspondent

OWING to the high rates ruling on the time charter market the East Asiatic Company has decided to cut down its service to New York, and the motorship *Erria* has been put on the Bangkok route. The *Jutlandia*, also employed on this route, has been converted to a hospital ship for operation under UNO in Korea. This month the *Falstria* will sail to New York and the Pacific, returning by the same route. Like the Swedish East Asiatic Company and Wilhelm Wilhelmsen, of Oslo, the East Asiatic Company has taken a considerable number of vessels on time charter during the last few years and many of these mean a loss even at the previously much lower rates. Since the rise in the freight market the East Asiatic Company has not taken any vessels on time charter.

In a note to the American Government, Denmark has pointed out that the monopoly of trading with Chile is a serious danger to Danish economy, and will considerably reduce Denmark's dollar earnings at a critical time. The arrangement is that 50 per cent of Chile's imports must be shipped by Chilean tonnage and the ships of three American shipping companies between whom a pool arrangement has been signed. The case has been raised by J. Lauritzen, of Copenhagen, through their American agents, West Coast Lines, J. Lauritzen having for many years operated a regular service between Northern Range ports and Chile. The Danish note stated that Danish vessels will probably be completely excluded from trading on the West Coast of South America and if the American authorities approve of the pool agreement it will mean that they approve of Chile's decree that 50 per cent of her imports will be kept from international shipping. The note went on to say that this will probably stand as an example for other nations, who will follow the policy of Chile in order to protect their shipping companies, thus harming international shipping and international trade as a whole. It is believed that Great Britain, Norway, Sweden and Holland have protested against the Chilean decree. Both sides were given an opportunity to state their case in writing before March 2.

Accounts for 1950

The Steamship Company Orient, of Copenhagen, has published its accounts for 1950. The fleet consists of the two motor vessels *Westralia* (8,270 tons d.w.) and *Astoria* (8,370 tons d.w.). Gross profits amounted to Kr.1,039,887, to which must be added interest and dividends amounting to Kr.984,067. Management expenses amounted to Kr.170,817, taxes to Kr.340,858, and sums written off to Kr.116,388. The net profit amounted to Kr.1,395,895 or about Kr.900,000 less than in the previous year. The balance transferred from the previous year was Kr.339,691. The amount available for disposal is Kr.1,735,586 and it is proposed that a dividend of 14 per cent be paid. The accounts of Burmeister & Wain show a total turnover of about Kr.163,300,000 and a profit of about Kr.15 mn. against about Kr.8.9 mn. in 1949. Exports accounted for Kr.111.5 mn. A dividend of 5½ per cent will be paid on preference shares and 6 per cent on founder shares. In an account for redemption of the preference share capital and writing up of founder share capital there now remains Kr.5.6 mn. On July 1, 1951, the founder shares will be written up, so that the founder share capital will amount to Kr.28.7 mn., and at the same time the preference share capital will be partly redeemed and set down from Kr.11.9 mn. to Kr.6.3 mn.

Vestjysk Dampskibsselskab (Mr. Erik Winther), of Copenhagen, has sold the 1,800-tons steamer *Olivia* to Finnish buyers, while the Steamship Company Jutlandia (Jens Toft, Ltd.) of Copenhagen, has sold the "Park" type steamer *Maria Toft* (4,625 tons d.w.) to Swedish buyers. She has been renamed *J. E. Manne*.

Mr. Ove Skou, of Copenhagen, who has already ordered a 6,850 tons d.w., 15 knots cargo liner from the Elsinore shipyard, to be of the same type as the motorship *Jytte Skou* and another building at Burmeister & Wain's yard, has ordered a similar vessel from a German yard in addition. It is reported that the Steamship Company Torm has ordered a 16,250 tons d.w. 14½ knots motor tanker from Uddevallavarvet, Sweden. The East Asiatic Company, of Copenhagen, has ordered another of the "P" class vessels from Nakskov Skibsværft. She will be of 10,000 tons d.w. and have dimensions 445 ft. b.p., 61 ft. beam and 27 ft. 2 in. draught. Her main engine will be a 7-cyl., 8,050 i.h.p. two-stroke single-acting B. & W. diesel, giving a service speed of 15 knots.

New Deliveries

The Elsinore shipyard has delivered the motorship *Bygholm*, the third and last of three sister ships ordered by the United Steamship Company, of Copenhagen. She is of 3,000 tons d.w., and has 171,360 cu. ft. cargo capacity, including 49,500 cu. ft. refrigerated space. She can carry four passengers and her 2,500 i.h.p. 6-cyl. two-cycle diesel gives a speed of 13 knots. The *Bastholm* and *Birkholm* were delivered in September and November last year. They are intended for Baltic, North Sea and Mediterranean trading. On February 15 Burmeister & Wain delivered the refrigerated motorship *Piast* to the Polish Ocean Lines, of Gdynia. The vessel, which was originally ordered by Skjelbreds Rederi, Kristiansand, but later transferred to the Gdynia America Line, is of 2,890 tons d.w. with a cubic capacity of 114,600 cu. ft. bale in the refrigerated holds and 74,650 cu. ft. grain for other cargo. Her dimensions are 315 ft. b.p. by 47 ft. 1 in. by 29 ft. 4 in. She carries eight passengers and is built to Lloyd's Regisiter highest class with ice strengthening. She is of the closed shelterdeck type with four holds. The refrigeration machinery was supplied by Sabroe. The main engine consists of a 10-cyl. two-stroke direct reversible B. & W. trunk diesel producing 4,200 i.h.p. at 165 r.p.m., and her trial speed was 16½ knots loaded.

BOOK REVIEWS

The Slide Rule in Theory and Practice, by G. P. Rawlings. (Percival Marshall & Co., Ltd., 23 Great Queen Street, London, W.C.2. Price 9s. 6d.)

To get the best use from a slide rule it is essential to have a thorough knowledge of the principles on which it works. There could be no better introduction to this useful instrument that this book offers. It is divided into three parts, one introductory, the second giving a clear and careful explanation of principles, and the third a careful step-by-step explanation of the methods of carrying out the various operations.

Cruising Under Sail, by Eric C. Hiscock (Oxford University Press. London: Geoffrey Cumberlage. Price 42s. net.)

On seeing Capt. (E) J. H. Illingworth's *Offshore*, many a cruising yachtsman must have wished that someone would write for him a book of the same calibre as that which Captain Illingworth has written for the ocean yachtsman. It may fairly be said that this is just what Eric Hiscock has done. Aided by the fine standards of production which one now naturally associates with the Oxford University Press, he has produced a book which every cruising man will want to own. Mr. Hiscock's qualifications for writing such a book are ample, as his cruises in his cutter *Wanderer II*, many of them single-handed, are well known. He is also an excellent photographer. Apart from the readability of the book, the amount of information that it contains is remarkable.

WHY MACHINERY AFT?

A REVOLUTIONARY DESIGN FOR A LINER WITH MACHINERY AFT

By A. C. HARDY, B.Sc., M.I.N.A.

Today in ship design there is a growing tendency to place propelling machinery aft. This is found not only in tankers, where it is essential, nor in certain coasters and short-sea traders, in which it is customary. Machinery aft has long been general in the largest Great Lakes bulk freighters, some of which are upwards of 600 ft. in length, and in smaller ships running in the same waters intended exclusively for passenger carrying. The ill-fated *Noronic* was an example. For seagoing duties, in recent years we have seen the 10,000-tons d.w. twin-screw cargo ship *Silvrain*, built on the Clyde by Beardmore for bulk cargoes and one of the largest single-deck ships of this kind ever constructed, with a length of 430 ft. b.p. The 4,700-tons d.w. twin-screw *Margretion* was another example. Both were ships of the early 1920s. The Danes built a single-screw refrigerated fruit ship of 151,000 cu. ft. capacity in 1936, now named *Egyptian Reefer*. The Matson Line had ocean-going passenger ships with machinery aft after the First World War.

All these have been more or less spasmodic attempts to achieve a real or a fancied design advantage of improved cubic or better accommodation layout. If success is to be measured by repetition, then it must be agreed that none save the Great Lakes freighters have fulfilled the hopes held out for them. Why? I think mainly because the wrong type of machinery was chosen: the motorships had oil engines which were not successful in any ship and were heavy: the steamers used the older type of uneconomical steam reciprocating or geared turbine machinery with Scotch boilers, an installation which was heavy and introduced problems of trim. The *Egyptian Reefer* had a modern well tried oil engine, rather long perhaps for the power it delivered. Generally speaking, shipbuilders have not regarded machinery-aft schemes with favour, except for tankers and certain classes of coaster and short-sea trader.

Unorthodox Arrangement

There are signs that a complete change of attitude is taking place: this is coincident with the arrival of newer types of lightweight machinery—geared turbines and high-pressure high-superheat watertube boilers on the one hand, and high-speed oil engines on the other, either geared to the propeller shaft or driving the shaft through electric generators and motors. These arrangements do not necessarily take up so much fore-and-aft space as the older machinery, and a certain juggling of machinery position is now possible. Modern electrically operated pumps need no longer be a deterrent to good control of trim. New kinds of cargo, new combinations of cargo, and different conceptions of passenger carrying, all invite investigation into the possibilities of placing machinery aft. Current orders for ships, and certain ships with machinery aft under construction or on the drawing board, suggest that while this type may never be universal, it will at any rate command increasing attention. In America, machinery aft ships have been proposed with most unorthodox cargo-handling arrangements and passenger decks alongside and above a fore-and-aft "cargo box."

In France, a passenger ship of about 6,000 tons gross, 410.1 ft. b.p. and of 19 ft. 3¼ in. draught, which is bound to make history, is now completing at the shipyard of the Forges & Chantiers de la Mediterranée at La Seyne, near Toulon. The *El Djezair* is a passenger and cargo ship of about 20 knots speed building for the Compagnie de Navigation Mixte for service between southern French ports and North Africa, with accommodation for about 450 passengers and a deadweight capacity of 2,200 tons. Study of the accompanying general arrangement plan will indicate a number of features which justify application of the outworn term "unique." It will be clear from the most brief glance that the application of the adjective "unique" is justified if only because of the fact that her machinery is aft. No other ships afloat have a comparable arrangement, except some of the most modern tankers. They are of single-screw type and propelled by geared turbines and watertube boilers, and have the boilers above and abaft the main machinery. This is common practice in the United States.

As far as the *El Djezair* is concerned, however, there are two differences from this practice: the first is that she is a twin-screw ship and the second that the twin sets of geared turbines are much further ahead of the boilers and in a rather "fatter" part of the ship than would be the case with a tanker. The boilers, incidentally, are special high-pressure high-superheat units designed and built by the shipyard and known commercially as the F.C.M. type. The longitudinal separation of boilers and turbines and the arrangement of these latter, two in number, on a fore-and-aft rather than on an athwartships arrangement, is an indication of the fact that steam, generated under modern conditions with high pressure and high superheat within reasonable limits, loses none of its virtue on its journey between the "fuel valve", i.e., the boiler, to the "cylinder", i.e., the turbine. The *El Djezair's* engine room is divided into two: main turbines and condensers and their auxiliaries in the forward compartment: auxiliary equipment, including diesel-driven generators, in a compartment abaft of this. The two fore-and-aft boilers, whose arrangement would be possible in no other way due to the narrowing of the ship at platform deck level, has made it possible for the designers to devote the best and fattest part of the parallel middle body at tank top and lower hold level to a substantial refrigerated cargo space, the decks above being clear all fore and aft, without interruption of public rooms and passenger accommodation by engine or boiler casings. It is somewhat surprising, however, to find No. 3 hatch trunked up to the superstructure deck.

Solution of Difficulties

Exactly how all this has been arranged from a point of view of net tonnage measurement is difficult to say in the absence of exact figures, for the ship is not yet complete, nor indeed are intimate details of machinery available at this time. It is certain, however, that ample power for 20 knots, as well as the size of machinery space for the necessary deductions for net tonnage, have been allowed for by the designers. It is the object of this article to suggest that the *El Djezair*, being the first ship of her kind and using lightweight modern steam machinery, is, if successful, likely to create a new vogue in the arrangement of passenger liners of this size and type. Indeed, it is even possible that, if in the light of the potential success of this new French-North African service ship people should overhaul their designs, we might see major changes in the largest of passenger ships which may now be contemplated. Many designers are of the opinion that machinery is sometimes placed amidships automatically . . . merely because no one has ever thought of putting it aft, except in tankers, in which its presence there is essential for fire reasons and in which difficulties of trim are easily overcome.

Unfortunately, no details are available as to the exact forepeak or double bottom tank capacities in the *El Djezair*. Difficulties which might be encountered by the concentration of too much weight aft appear to have been solved rather neatly by the fore-and-aft separation of geared turbines, condensers and their

auxiliary machinery and boilers, as mentioned already. Critics might suggest that this creates a certain amount of waste space and complication in the lead of main steam pipes. To offset this disadvantage, there is a large refrigerated space amidships in the fattest part of the ship. Let it again be emphasised, too, that while the *El Djezair* is not advanced as the ultimate solution to all powering problems of ships of about 6,000 tons gross, her unorthodox arrangement is such that the ship cannot be neglected. Furthermore, it reflects that boldness in conception of design which now characterises the whole of French shipbuilding.

A desire to place machinery aft, but obviously with a compromise, is reflected in a somewhat larger ship, the *Lyautey*, a new vessel for the Cie. de Navigation Paquet service between Marseilles and Casablanca, of 22 knots speed with 18,600 horsepower on twin screws, in which steam is delivered by three boilers of similar type to those in the *El Djezair*. In the *Lyautey* the machinery is about two-thirds of the way aft.

Arrangement of the "El Djezair"

The *El Djezair* is lower forward than aft by one deck, but abaft No. 2 hatch everything is built into the curved superstructure and the whole of the ship is enclosed as far as possible. This provides large clear public decks, and the shape and efficiency of the funnel guarantees that the exhaust gases from the two boilers can in no circumstances be an embarrassment to the passengers. From the general arrangement plan, it will be seen that there is a forecastle joining the remainder of the structure on B deck, with an open portion on either side. This means that the forward end of the superstructure is virtually a breakwater in the worst of weather. The open deck space aft is on D deck. There is a long superstructure on E deck with four boats on either side. This is broken from the structure which forms the base of the navigating house by No. 3 hatch, which is trunked up. The general arrangement, as will be seen, places passengers towards the forward end and public rooms towards the after end, there being a rigid division between the classes.

In some respects it would seem that a great opportunity has been missed in not devoting, for example, the whole of either B or C decks to public rooms, with an extensive glassed-in promenade extending aft from a forward lounge with a splendid view over the bows. As it is, this view is shared by the relatively few passengers whose cabins happen to look forward. Possibly this suits the requirements of the trade, but one cannot help reflecting that were a design of this kind adapted for ocean voyages and were she a one-class type, a more favourable arrangement of space could have been made. It will be noted that there is a fairly large trooping tweendeck space forward.

Public Rooms

With regard to the public rooms, the first-class dining saloon is on B deck towards the after end, abaft which is a bar and smoking room, the area of which appears to be spoiled by the boiler room uptakes. It is true that they are long and narrow owing to the disposition of the boilers, but one cannot help thinking that the more logical layout would have been to place cabins in this part of the ship and the dining saloons and other public rooms towards the forward end. Also, side-loading of cargo to avoid trunking up No. 3 hatch would have left the space between the forward end of the superstructure and the boiler uptake completely clear. As it is, the otherwise clear space is encumbered first of all by No. 3 hatch, secondly by the machinery trunking, which is just forward of the dining saloon, and thirdly by the boiler room uptakes. The position of the machinery trunkings is not an embarrassment, however, because pantries, galley, etc., can be arranged on either side. C deck is notable for the large glassed-in promenade on both sides. The second-class smoking room is underneath the first-class dining saloon, the second-class dining saloon being on B deck with the main galley abaft that and, of course, a good lift service to the first-class dining saloon on D deck. The arrangement on D deck permits crew accommodation at the aft end.

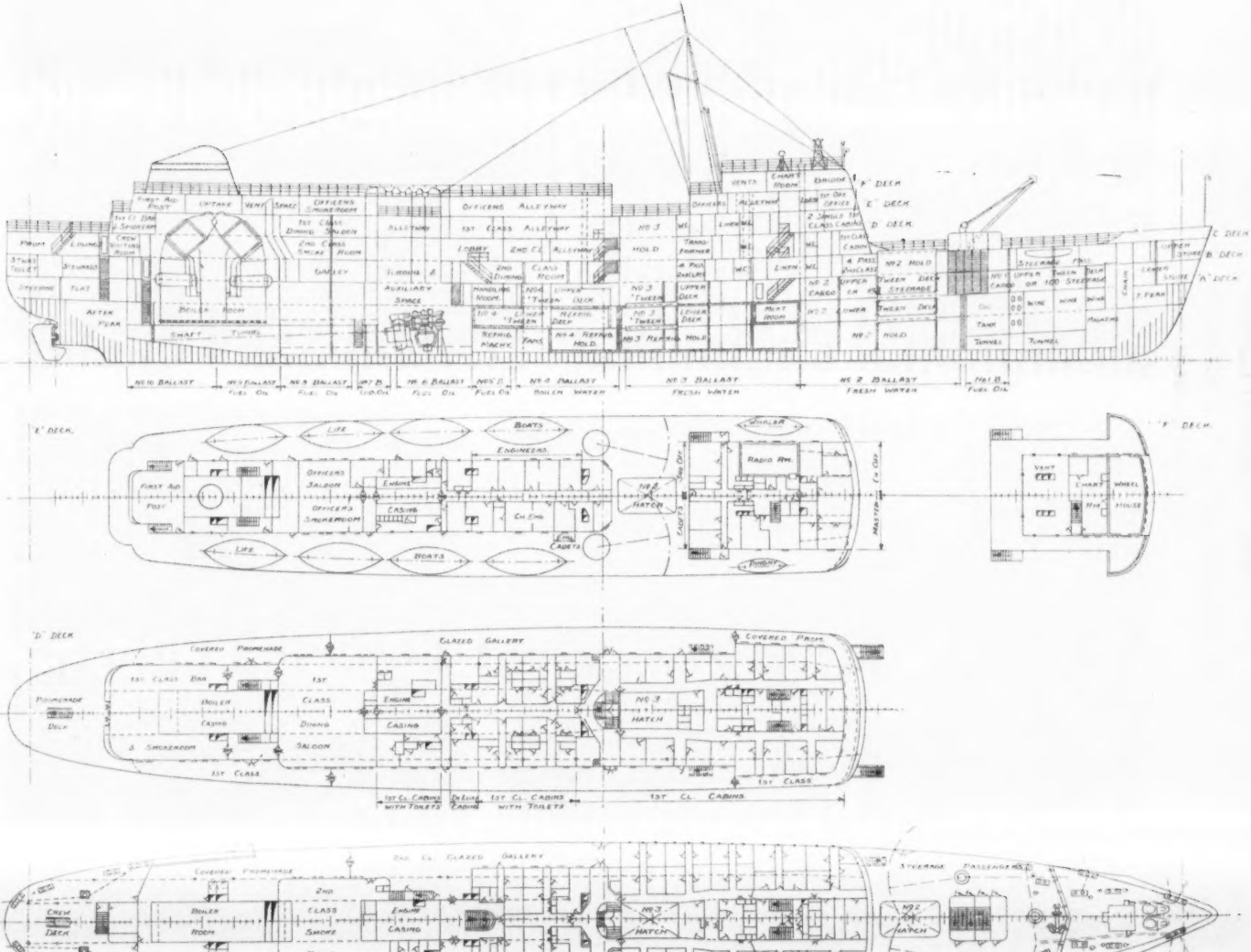
If we agree that this particular arrangement probably does not permit of the optimum layout which otherwise would be thought possible, in some respects the ship is an argument in favour of machinery two-thirds of the way aft as in the *Lyautey*. To call the general arrangement a muddled one would be an unfair criticism in the absence of exact knowledge of service conditions, which have obviously shaped the design. To call it imaginative would be to do less than justice. To say that it has a big future is but a challenge to the imagination of designers. Other features which are worthy of mention are the deep cruiser stern, the absence of deadwood aft and the rather large semi-balanced rudder. Also, all cargo holds—in fact, the pay-earning part of the ship—are forward of the machinery, except for one or two public rooms. Cranes are employed, two in number, forward, serving Nos. 1 and 2 holds. Clearly a number of the questions which arise on reading the above and studying the plan will answer themselves when the capacity of peak and double bottom tanks is known and also the bale, grain, or "reefer" cubic figures are available.

More Ships with Machinery Aft

French naval architects seem frequently to favour ships with machinery aft today and, though they are on a smaller scale, the *El Djezair* offers comparison with a group of five ships of 2,600 tons d.w., mainly for cargo carrying in the North African trade. They are named *Atlas, Sahara, Tafna, Tell, Touggourt*. Three being built at Port de Boue and two at the Lorient Dockyard. They are single-screw ships with a stern of full cruiser type marked with an almost complete absence of deadwood and a fully balanced spade rudder comparable to that found in a whalecatcher. Their single screw, which is attached to the end of a pronounced "knob" on the sternframe, is operated by a 6-cylinder Sulzer two-stroke oil engine developing 3,000 b.h.p. at 150 r.p.m. and giving a service speed of 13 knots. These ships have a capacity of holds and tweendecks of 3,206 cu. m. and a refrigerated capacity of 2,121 cu. m. They are marked by a rise of keel forward from frame 105 at an angle of about 30 degrees, reminiscent of the earlier days of the most extreme Maierform, an arrangement which must surely cut down the capacity of the deep tank and of No. 1 hold. One of the really remarkable things about these ships, however, is the fact that within a length overall of 316 ft. 6 in., they find space for four holds, No. 1 of which is rather attenuated, one tier of tweendecks all fore-and-aft and a second tier for about half the length of the whole space, merging into the navigating bridge. This is an extended-aft forecastle and one cannot help feeling that its presence may be necessary to compensate for loss of cubic in other directions. The point to be emphasised, however, is that here is another unusual arrangement for a ship with machinery aft. Ships of this deadweight tonnage with such an arrangement are, of course, no strangers to shipbuilding today; indeed, almost the whole of the "flat iron" collier fleet trading to the Thames is so arranged. Seldom do we find it, however, in such an extreme form. The experiments of the French in this connection are undoubtedly worth watching.

Another proposal for a ship with machinery aft, which has so far not proceeded beyond the drawing board, is one the position of whose machinery (either geared turbine and watertube boiler or oil engine—the choice has not yet been made) is governed by the variety of cargo which it carries. In brief, on dimensions which cannot at this juncture be disclosed, it is intended to evolve a ship of medium dimensions capable of carrying general cargo, oil in bulk, refrigerated cargo and upwards of 80 passengers. The latter, together with the refrigerated cargo and the machinery, are aft. General cargo is carried in a long

(*Continued on page* 251)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ENGINEERS
OFFICERS SALOON
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D DECK
COVERED PROMENADE
GLAZED GALLERY
COVERED PROM
1ST CLASS BAR
PROMENADE DECK
BOILER CASING
1ST CLASS DINING SALOON
ENGINE CASING
No 3 HATCH
S SMOKEROOM
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DE LUXE CABINS
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2nd CL GLAZED GALLERY
CREW DECK
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ENGINE CASING
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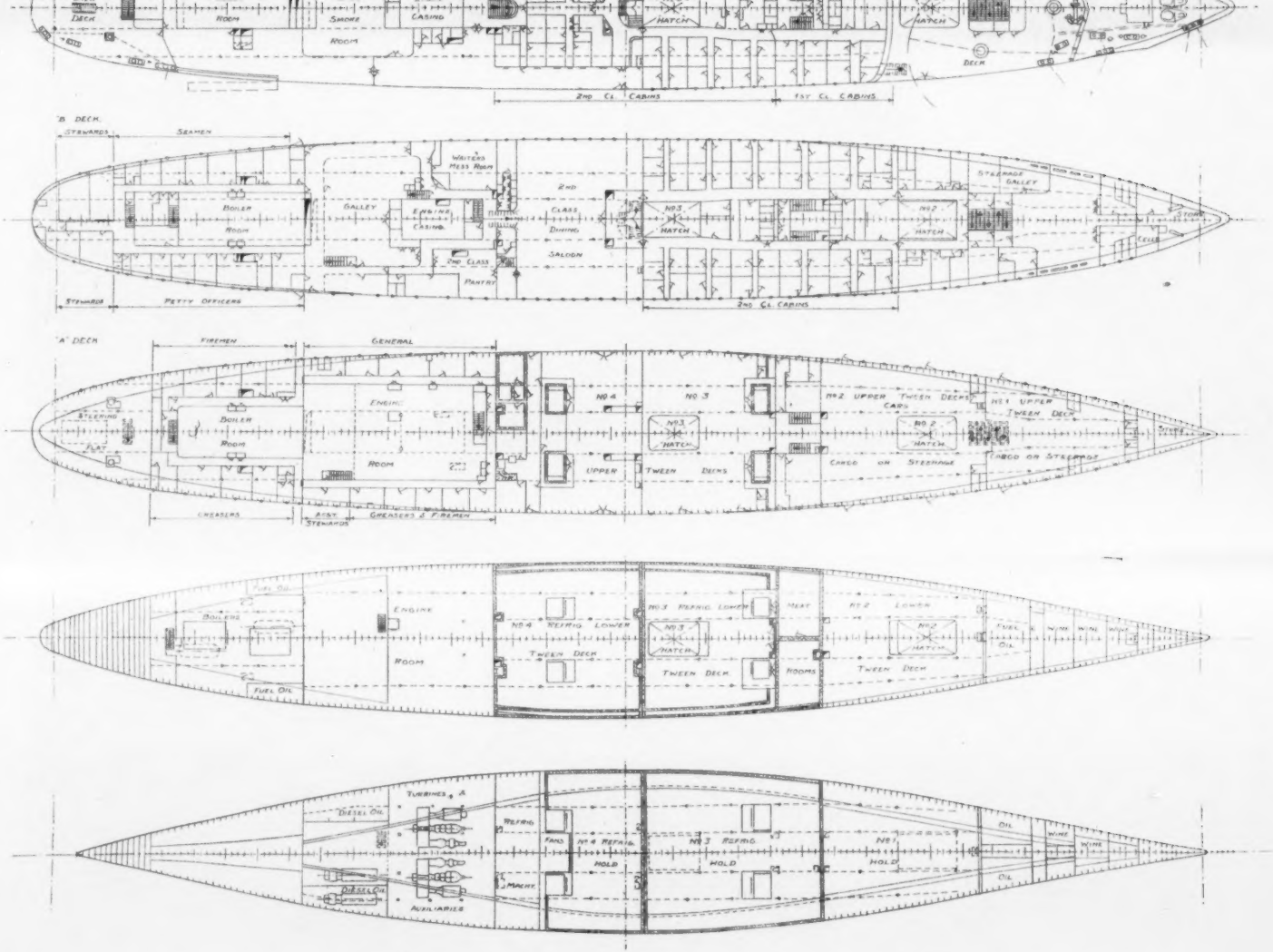
No 2 HATCH
STEERAGE PASSENGERS



General arrangement of the turbine-driven passenger and cargo liner "El Djezair"

Building by Forges et Chantiers de la Mediterranée, La Seyne, for the Compagnie de Navigation Mixte

NEW BABCOCK MARINE BOILER DESIGN

FIRST INSTALLATION IN THE ARGENTINE TANKER "PUNTA MEDANOS"

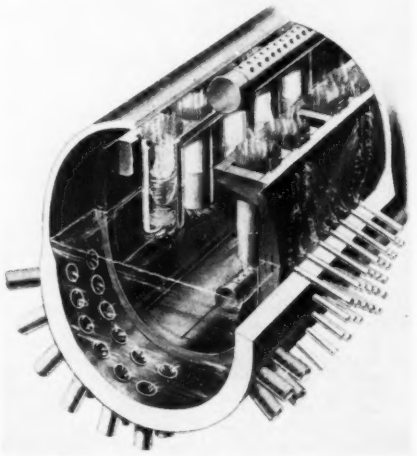
THE latest development in the marine field by Babcock & Wilcox, Ltd., is the two-drum "Integral Furnace" unit, a simplified version of the Babcock double-furnace controlled superheat boiler. Two of the new design boilers are installed in the tanker *Punta Medanos*, a twin-screw turbine-driven vessel of 8,500 tons deadweight, built for the Argentine Navy by Swan, Hunter & Wigham Richardson, Ltd., Wallsend. The *Punta Medanos* was illustrated on p. 84 of THE SHIPPING WORLD of January 10, 1951.

Basically, the new design of boiler consists of a single bank of tubes inclined at 15 degrees to the vertical, with an upper steam/water drum and a lower water drum. The furnace side-wall is of watertube construction and the back wall can be either plain refractory or water-cooled, according to the furnace rating. These features conform with the classic arrangement, but in detail the boiler design differs widely from that of all other types of two-drum boiler.

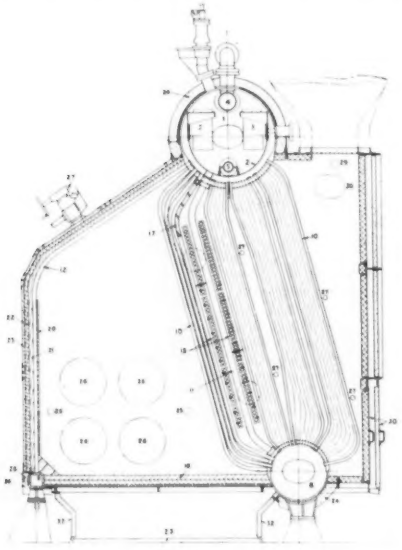
The furnace walls are of the usual Babcock stud-tube construction, and comprise a single row of tubes with electrically-welded studs; the front section of the furnace has these tubes completely covered by chrome ore, the rear section being exposed to flame, with chrome ore used as the sealing medium between the tubes. In this way the furnace temperature in the section nearest the burners is maintained sufficiently high to promote good combustion at low ratings with the lower grades of fuel oil. This construction offers extended heating surface for radiant heat absorption and reduces furnace maintenance. The furnace wall has a separate steam/water circuit (quite distinct from that of the main tube bank), the header at the base being fed by downcomers direct from the upper drum. The main bank, with superheater interposed, is similar to that of a standard single pass header type Babcock marine boiler, with 2 in. o.d. tubes in the furnace rows followed by 1¾ in. tubes in the rest of the bank. The superheater support plates are secured to 3 in. diameter water tubes running between the two drums.

Circulatory System

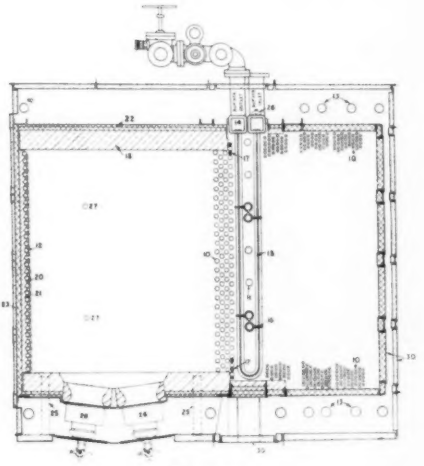
The circulatory system is an outstanding feature of this design of boiler. The lower part of the upper drum is divided to form an annular space and the mixed steam and water from the evaporating tubes is discharged into this space and thence into cyclone separators. The steam is released from the top of the cyclones, passing into the dry pipe, and the water is directed downwards into the main body of the drum, where as a bubble-free fluid it passes to the downcomers which feed the bottom drum and the lower header of the water wall. With this separation of the drum water from the steam/water mixture, the well-proved traditional characteristics of the Babcock header-type boiler are retained, and a glance at the diagrams will show that it is impossible for any generating tubes to become downcomers or to be starved of water irrespective of the boiler loading or of the rate at which this loading is varied. The absence of steam bubbles passing through the main mass of water in the upper drum prevents wide variation in water level when rapid manoeuvring takes place, as there is no general collapse of water level when the oil burners are shut off, and conversely no appreciable rise in level when they are all lit up again. This greatly



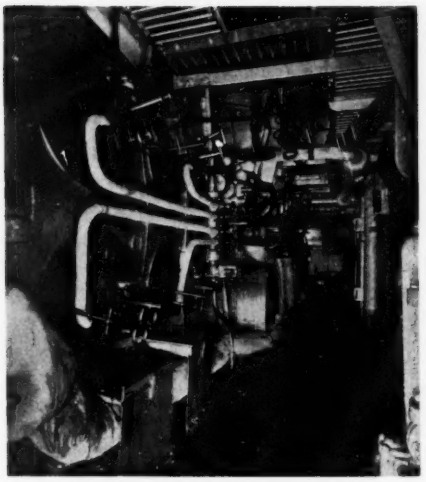
Diagrammatic view of boiler drum, showing operation of the Babcock patent Cyclone separators



Cross-section



Plan view



The stokehold of the "Punta Medanos," showing the oil firing equipment of the boilers

simplifies the operation of the automatic feed water regulator and prevents the severe hunting which is unavoidable if there is a wide variation in the water level when manoeuvring.

The *Punta Medanos* is fitted with two of these boilers, built under licence, by the main machinery contractors, Wallsend Slipway & Engineering Co., Ltd., Wallsend-on-Tyne. In addition to steam for the main propelling machinery and the electric generators, the boilers supply saturated steam for ship's service, through Babcock desuperheaters of the surface type, coupled to the boiler drums, which use boiler water for cooling. Each boiler has a heating surface of 6,740 sq. ft., a superheater of 571 sq. ft., and a tubular air heater of 7,540 sq. ft. Operating conditions are 400 lb. per sq. in. pressure and 750 deg. F. temperature at the supercharger outlet, the drum being designed for a working pressure of 455 lb. per sq. in. The feed water is heated by bled steam to a temperature of 300 deg. F. The overall boiler efficiency is of the order of 87.5 per cent on the higher calorific value of the fuel.

The *Punta Medanos* is a unit of the Argentine Navy and is available as a training vessel for personnel. In view of this, the closed stokehold system has been adopted to conform with their general naval practice. The Howden forced draught fans are electrically driven and located in the boiler room. The Wallsend-Howden oil-firing equipment includes two sets of Simplex oil-firing units, each capable of carrying full load (which is the equivalent of 110,000 lb./steam per hour from the two boilers). A full complement of Babcock standard sootblowing equipment is fitted to the boilers: retractable single-nozzle blowers for the furnaces followed by multi-jet type units for the remainder of the evaporating banks and the air preheaters.

First British Tanker with Cargocaire

THE MOTOR tanker *British Warrior*, launched last week by Lady Gale, wife of Lieut.-General Sir Humfrey Myddleton Gale, from the Sunderland shipyard of Joseph L. Thompson & Sons, Ltd., has the distinction of being the first British-owned tanker to be fitted with the Cargocaire system specially designed to prevent corrosion and contamination in the cargo tanks. A number of merchant and naval tankers in the U.S.A. have already been fitted with this system, which dehumidifies and ventilates the cargo tanks.

It is understood that the *British Warrior* is to be employed exclusively in the petrol-carrying trade, so that the Cargocaire system will have every opportunity to justify the claims of its manufacturers. Corrosion is prevented with this system by maintaining humidity in the tanks constantly at a low level, thus eliminating weak acids formed by condensed sweat. This, as has been proved in the U.S.A., can prolong by an appreciable amount, the life of ship's structure and piping and also reduce maintenance costs.

WHY MACHINERY AFT?

(*Continued from page* 249)

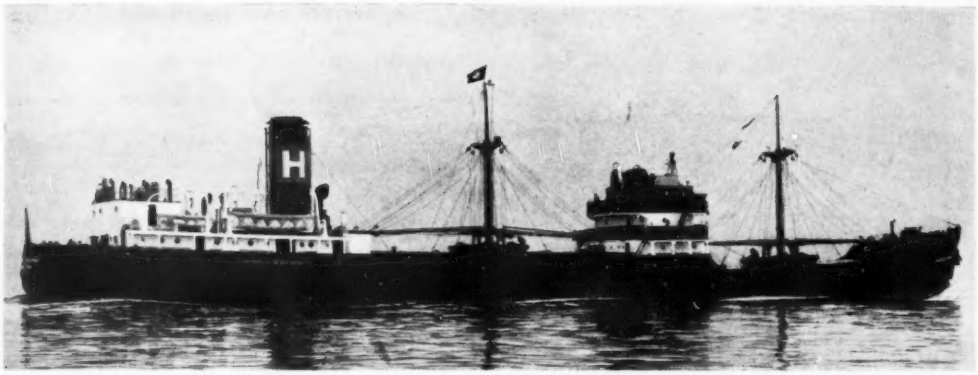
box-shaped hold, extending for the whole length of the oil tank space and flanked by oil tanks with oil tanks underneath and a pumproom at the forward end. There is substantial cofferdam space between the after end of the oil-cum-general cargo hold and the forward end of the refrigerated space. There are three cargo holds for general cargo, all served by electric cranes stowing flush with the deck when the ship is at sea, and the general cargo is stowed in a box-shaped arrangement similar to that found in the big Swedish oil and ore carriers. Refrigerated space is arranged so that loading can take place through side doors. Normal tropical fruits are thought of in this connection with, of course, the ability to carry deep-freeze cargo as necessary. Clearly, some fine adjustment of fore-and-aft weights is necessary, but the problem is aided by the fact that the oil tanks can be employed for ballast on the outward voyage from the U.K.

It may at first sight seem that too much is being attempted in the one hull. Examination of the design at an official level, however, has shown that there is no objection whatever to the construction of the ship and that the only difficulty, which could probably be overcome, might be a certain inconvenience regarding the landing of passengers, because it would be necessary to discharge the oil cargo first. Possibly this would be a matter of adjustment of schedule; of adjustment so that the ship would arrive very early in the morning and be fully discharged for going alongside by breakfast time. Obviously a compact machinery space is desirable in a ship of this kind.

One cannot help reflecting that here are further cases where forward-looking arrangements cannot be wholeheartedly adopted because of the obsolete net tonnage measurement regulations which still hold. One does not advance machinery aft as the cure for everything; one does not attempt to minimise the difficulties which may be encountered; one does feel, however, that in view of progress with modern machinery, to place it aft is a logical step to take. The three examples quoted are at least unique appreciations of the situation, one of which has been carried into actual practice, one approved by authority, while the third is now being completed in a shipyard in the South of France. What are the advantages of this arrangement? . . . a clear cargo space with side loading (acceptable for many kinds of cargo) with improved cubic and clear continuous fore and aft decks above: an optimum public rooms layout in passenger ships and a compact machinery space in the stern of the ship with—if desired—remote control from the bridge.

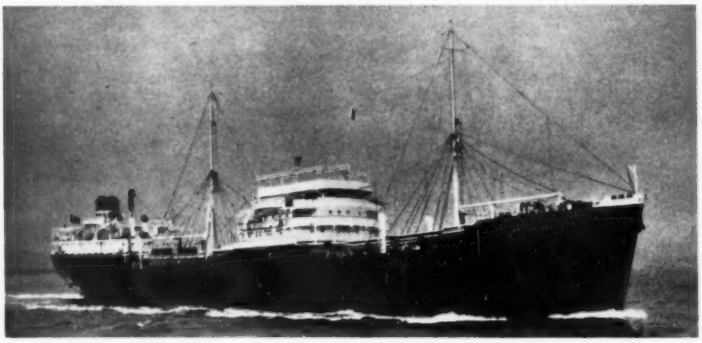
Higher Powers in Icelandic Trawlers

THE SECOND pair of trawlers which the Goole Shipbuilding & Repairing Co., Ltd., is building for the Icelandic Government and which are sister ships to the *Hallveig Frodadottir* and *Jon Thorlaksson*, are now nearing completion. Since the *Hallveig Frodadottir* and her sister ship entered service some two years ago, they have proved remarkably efficient, and the propelling machinery, which was the subject of special interest at the time of their building, has amply justified the expectations of the designers and the claims of those who supplied the engines, couplings and gearing. The propelling machinery, as described in THE SHIPPING WORLD of March 9, 1949, comprises a Ruston four-stroke, unidirectional, five-cylinder pressure-charged engine driving through a fluid coupling of the scoop-control type to a S.L.M. oil-operated reverse reduction gear with 4:1 ratio. In addition, a drive is taken through a S.L.M. oil-operated clutch to a generator at the forward end of the engine for operating the trawl winch. The engine on each of the first two vessels develops 1,100 s.h.p. continuously at 420 r.p.m. In the two motor trawlers now fitting out at Goole, the installations differ slightly in that the S.L.M. gears supplied by Modern Wheel Drive Ltd., Chesham, Bucks., are designed to transmit 1,390 b.h.p. at 420 r.p.m. as against 1,100 b.h.p. at 420 r.p.m. in the first two vessels, while the reduction ratio to the propeller is 4.07:1 as against 4:1.



Steam Collier "Hudson Sound" from Troon

Of 2,524 tons gross and fitted with a cruiser stern, the single-screw steam collier *Hudson Sound* has been completed by the Ailsa Shipbuilding Co., Ltd., for the Hudson Steamship Co., Ltd. With a total deadweight of about 3,370 tons, she has dimensions of 305 ft. length o.a., 42 ft. moulded breadth and 21 ft. depth to main deck. The propelling machinery, supplied by the shipbuilders, comprises one set of triple-expansion surface condensing-steam engines with two marine boilers, providing the vessel with a speed of 10½ knots



Motor Tanker "British Navigator"

The single-screw motor tanker *British Navigator* has been delivered to the British Tanker Co., Ltd., by Joseph L. Thompson & Sons, Ltd. The *British Navigator*, of normal modern tanker design, has a gross tonnage of 6,100 and a deadweight of 8,400 tons. Her principal dimensions are 423 ft. length o.a., 56 ft. breadth and 30 ft. 1 in. depth. There are eight centre and 16 wing oil tanks served by two main pump rooms together with one small pump room. The propelling machinery, situated aft, has been supplied by William Doxford & Sons, Ltd., and consists of a 3-cylinder diesel engine developing sufficient power for a service speed of 11 knots

Dutch-Built Motorship for Yugoslavia

The first of two sister ships for the Jugoslavenska Linijska Plovidba, of Rijeka, has been completed by the Netherlands Dock & Shipbuilding Company at Amsterdam. She is the *Slovenija*, a motor cargo vessel of about 5,800 tons gross with a deadweight capacity of about 9,000 tons. Her length b.p. is 435 ft., breadth moulded 59 ft. and depth to shelter deck 39 ft. 5½ in., while her mean draught is 26 ft. The main engine has been constructed by the shipbuilders and comprises a Stork diesel engine of the 6-cylinder two-stroke double-acting type. This engine develops 6,250 b.h.p. and provides the ship with a speed of 16 knots

NEW CONTRACTS

Yards in Great Britain and Northern Ireland

Shipowners	No. of Ships	Type	Approximate Tonnages Gross	Deadweight	Dimensions (ft.)	Speed (knots)	Propelling Machinery	Total h.p.	Engine Builders	Shipbuilders
H. Hogarth & Sons	1	Cargo	—	7,500	—	—	Tr.-exp. steam	—	N.E. Marine	Wm. Pickersgill
H. Hogarth & Sons	1	Cargo	—	7,500	—	—	Tr.-exp. steam	—	Shipbuilders	John Readhead
Det Bergenske Damps., Bergen	1	Newcastle-Bergen pass. liner	—	—	—	—	Steam turbine	—	Wallsend Slipway & Eng. Co.	Swan, Hunter & Wigham Richardson, Wallsend
Stephenson Clarke	2	Colliers	—	2,400 (each)	—	—	Sulzer diesel	—	George Clark (1938)	S. P. Austin & Son
Charrington S.S. Co.	2	Self-trimming colliers	—	2,900	—	—	Tr.-exp. steam	—	N.E. Marine	S. P. Austin & Son
Stephenson Clarke and North Thames Gas Board (1 each)	2	Self-trimming colliers	—	4,600 (each)	—	—	Tr.-exp. steam	—	N.E. Marine	S. P. Austin & Son
Orient Line	1	Passenger liner	28,000	—	—	22	Tw.-scr. geared Parsons turbine	34,000	—	Vickers-Armstrongs, Barrow
Greek owners	1	Passenger liner	20,000	—	—	—	Geared turbine	—	—	Alex. Stephen
Power S.S. Co.	1	Cargo	—	11,650	—	—	Doxford diesel	6,600	R. & W. Hawthorn, Leslie	Burntisland S.B.
Corpn. or Trinity House	2	Light vessels	385 (each)	—	—	—	Non-propelled	—	—	Philip & Son
British Railways (Scottish Region)	—	Pass. and car. ferry	—	—	70.75 length o.a.	—	Gleniffer diesel	160	—	Wm. Denny & Bros.
Commonwealth and Foreign Yards										
—	1	Cargo	500	—	206.7 × 34	—	Diesel	—	—	Werft J. J. Sietas Hamburg-Neuenfelde
—	1	Cargo	1,200	—	—	—	Diesel	1,600	—	Gutehoffnungshutte A.G., Walsum-on-Rhine
P. Dekker Gzn., Zwolle	1	Coaster	—	390	—	—	de Industrie diesel	200	—	N.V. D. en Johs. Boot Scheeps. de Vooruitgang, Alphen a/d Rijn
Union Oil Co. of California, Los Angeles	1	Tanker	—	18,000	442 (long)	—	—	—	—	Bethlehem-Sparrows Point Shipyard, Inc.
Norddeutsche Hochseefischerei, Bremerhaven	1	Trawler	575	—	—	—	Steam	—	—	A. G. Weser, Bremerhaven
Gemeinwirtschaftliche Hochseefischerei, Bremerhaven	1	Trawler	555	—	—	—	Steam	—	—	A. G. Weser, Bremerhaven
J. F. Braunlich, Lubeck	1	Cargo	1,400	2,400	—	—	Diesel	—	—	Lubecker Masch. Gesellschaft
Swedish owners	1	Cargo	1,800	—	—	—	Diesel	—	—	Lubecker Masch. Gesellschaft
F. A. Vinnen & Co., Bremen	1	Cargo coaster	—	900	—	—	Diesel	—	—	Elsflether Werft A.G.
Vereinigte Stennes Reedereien, Mulheim-Ruhr	1	Coastal tanker	—	630	—	—	Diesel	—	—	Elsflether Werft A.G.

LAUNCHES

Yards in Great Britain and Northern Ireland

Date	Shipowners	Ship's Name and/or Yard No.	Type	Approximate Tonnages Gross	Deadweight	Dimensions (ft.)	Speed (knots)	Propelling Machinery	Total h.p.	Engine Builders	Shipbuilders
Jan. 30	John Harker, Ltd.	*Southdale H.* (242)	Coastal tanker	258	—	—	—	Diesel	—	—	John Harker, Ltd.
Feb. —	North of Scotland & Orkney & Shetland S.N. Co.	*St. Ola*	Pass. and cargo	580	—	178 (long)	13	Atlas Polar diesel	1,025	—	Alex. Hall
Feb. 23	Alexandra Towing Co.	*Canada*	Tug	230	—	99 b.p. × 26.5 × 13	—	Tr.-exp steam	1,000	Chas. D. Holmes	Cochrane & Sons
Feb. 23	Denholm Line	*Lylepark* (467)	Cargo liner	5,600	—	—	—	Diesel	—	—	Chas. Connell
Feb. 23	A/S Hav and A/S Havtank, Oslo	*Stavik* (1799)	Tanker	8,760	13,000	465 b.p. × 63.5 × 36.25	12.25	Sin.-scr., 4-cyl., 2-str. Doxford diesel	3,750	Wallsend Slipway & Eng. Co.	Swan, Hunter & Wigham Richardson, Wallsend
Feb. 27	United S.N. Co.	*Dalmore* (1058)	Tanker	9,800	15,000	—	—	Diesel	—	—	Lithgows
Feb. 27	Hvalfanger Polaris A/S, Nanset	*Polarbris* (721)	Tanker	12,800	19,000	566 × 72.5 × 40.5	15.75	Sin.-scr., 6-cyl. Doxford diesel	8,000	Shipbuilders	Barclay, Curle

TRIAL TRIPS

Yards in Great Britain and Northern Ireland

Date	Shipowners	Ship's Name and/or Yard No.	Type	Approximate Tonnages Gross	Deadweight	Dimensions (ft.)	Speed (knots)	Propelling Machinery	Total h.p	Engine Builders	Shipbuilders
Feb. 15	China Nav. Co.	*Changchow* (654)	Cargo and pass.	7,800	7,200	450 × 62 × 35	—	Sin.-scr., 6-cyl. Doxford diesel	6,600	Shipbuilders	Scotts' S.B.
Feb. 27	Icelandic Govt.	*Olafur Johannesson*	Trawler	720	—	183.5 b.p. × 30 × 16	—	Tr.-exp. steam	1,200	Shipbuilders	Hall, Russell
Commonwealth and Foreign Yards											
—	Mathies Reederei K.G.	*Svealand* (758)	Cargo	1,381	2,200	—	—	6-cyl., 4-str. M.A.N. diesel	1,600	—	H. C. Stulcken Sohn, Hamburg
Jan. 27	Rederi A/B Varing, Stockholm	*Cali* (launched as Birgit Thorden)	Cargo	1,500	—	281 o.a. × 41 × 26.25	13.5	6-cyl., 2-str. Hamilton diesel	1,700	General Machy. Corp., Hamilton, Ontario	Uddevallavarvet A/B
Feb. —	Rotterdamsche Kolencentrale	*R.P.S.* (454)	Cargo	499	935	1943.3 × 28.4 × 12.8	11	8-cyl. Werkspoor diesel	500	—	Zaanlandsche Scheeps. Maats., Zaandam

MARITIME NEWS IN BRIEF

From Correspondents at Home and Overseas

The Rotterdam Chamber of Commerce is planning to organise an international conference this spring with a view to establishing some kind of cooperation between the big Continental North Sea ports. This proposal is the first result of a suggestion put forward by Dr. Jan Oyevaar, Holland's Director-General of Shipping. In a speech in 1949 in Hamburg, he first mentioned the idea of a "New Hanseatic League." He elaborated on the idea in another speech in Amsterdam last December. He argued that the traffic is too small for the total capacity of the Western European ports. His idea would not mean banning "healthy competition" between the various ports, but it would eliminate "unlimited and unbridled competition." Port authorities of Amsterdam and Rotterdam are prepared to make an effort to realise Dr. Ovevaar's plan, but they want to limit membership in the first place to the ports of Antwerp and Ghent in Belgium, Rotterdam, Amsterdam and Delfzijl in Holland, and Emden, Bremen and Hamburg in Germany.

The death has occurred of Mr. Rupert Stanley Cotton, director of the Hain Steamship Co., Ltd. Mr. Cotton joined the company in 1894 and was appointed a director in 1928. He was joint managing director during the war, but resigned owing to ill health in 1945, remaining a director. He became a member of the Baltic Exchange in 1906 and was also a fellow of the Institute of Chartered Shipbrokers.

At the annual meeting of the General Council of British Shipping, held last week, Lieut.-Colonel Austin G. Bates (Liverpool Steam Ship Owners' Association) was unanimously elected chairman for the ensuing year, and Mr. Charles E. Wurtzburg and Viscount Runciman (Chamber of Shipping) joint vice-chairmen.

The directors of Furness, Withy & Co., Ltd., have decided to commemorate the 60th anniversary of the incorporation of the company by the distribution of a special dividend of 2½ per cent on the ordinary stock, not subject to tax, out of surplus on realisation of investment. It was further decided to allocate £150,000 to staff benefit funds.

Mr. C. R. Driver has resigned from the board of Andrew Weir & Co., London, Ltd. Mr. Eric F. C. Mowlam and Mr. John A. Dawson have been appointed additional directors.

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The privately-owned U.S. merchant fleet increased by 25 ships during January, bringing the total to 1,202 ships of 14,333,000 deadweight tons, according to the National Federation of American Shipping. The sale by the U.S. Maritime Administration of 138 ocean-going merchant ships for private U.S.-flag operation took place in the first two weeks of January, but only 22 cargo vessels and one tanker out of this total were actually transferred to private owners during the month, the remaining 115 ships being still in the process of transfer. Two new vessels were added to the nation's private fleet during the month. They are the 26,000-tons liner *Independence*, delivered to American Export Lines, and the 20,000-tons tanker *Atlantic Engineer*.

Colonel Sir A. Stanley Angwin is to relinquish the chairmanship of Cable & Wireless, Ltd., to take up a post with the Commonwealth Telecommunications Board. He will be succeeded by Major-General L. B. Nicholls, now managing director of the Company. Mr. N. C. Chapling, traffic manager, is appointed managing director. The appointments will take effect as from April 1.

The appointment has been announced of Lieut.-Cdr. H. Dudley Hayes, R.N.R., as assistant marine manager of the Sperry Gyroscope Co., Ltd., in which capacity he also acts as deputy to the marine manager, Captain G. C. Saul. Commander Hayes joined the Sperry Gyroscope Company in July 1947.

A memorial service for the late Mr. E. A. V. Angier, of Hall, Angier & Co., Ltd., and a member of the Baltic Exchange for 48 years, was held at St. Andrew Undershaft, St. Mary Axe, London, E.C.3, on Thursday.

On February 1, Japan had 101 ships in international trade, comprising 85 dry cargo vessels of 712,629 deadweight tons and 16 tankers of 218,511 deadweight tons.

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The passenger liner *Aorangi*, 17,491 tons, is to resume her trans-Pacific service. She will sail from Sydney for Auckland, Suva, Honolulu and Vancouver on April 5. The resumption of the service, which was suspended a short time ago due to the losses incurred through lack of traffic, has been made possible by subsidies from the Canadian, Australian and New Zealand Governments. The subsidy is to amount to $400,000 (about £142,800), of which two-thirds is to be paid by the Canadian Government, the remainder to be shared between Australia and New Zealand.

The following have been nominated as governors of South Shields Marine and Technical College: Mr. R. S. Chipchase (Tyne Shipbuilders' Association and the North-East Coast Repairers' Association); Mr. J. D. Carmichael (North-East Engineering Employers' Association); and Mr. G. H. R. Towers (Institution of Electrical Engineers and the North-East Coast Institution of Engineers & Shipbuilders).

The motorship *Lambrook*, 10,260 tons d.w., built in 1942, has been bought from Galbraith, Pembroke & Co., Ltd., by the South American Saint Line, Ltd. She will be delivered to her new owners in April and renamed.

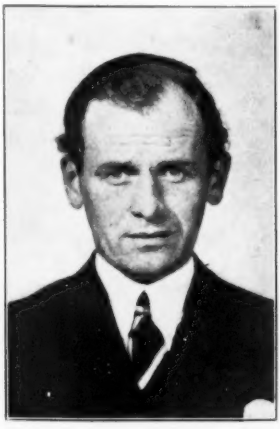
Capt. J. B. Macarthy has been appointed commodore of the fleet of the Eagle Oil & Shipping Co., Ltd., in succession to Capt. A. R. Hicks, who retired on January 31. Capt. Macarthy is at present in command of the *San Salvador*.

Moore-McCormack Lines has taken delivery of the 7,606-tons *Muncie Victory* from the U.S. reserve fleet and will rename her *Mormacspruce* for operation in service to Scandinavian and Baltic ports.

The annual general meeting of the Institute of Marine Engineers is to be held on April 2, at 5.30 p.m. and not on April 3 as previously announced by the Institute.

MR. T. H. BLACKHAM, manager and underwriter of the Reliance Marine Insurance Co., Ltd., has been re-elected chairman of the London Underwriters' Association. Mr. Blackham entered the insurance business with the Reliance Company in 1913. He became underwriter in 1945. He is also marine underwriter for the Guardian Assurance Co., Ltd., and the Guardian Eastern Insurance Co., Ltd. Mr. Blackham is a member of the committee of the Liverpool and Glasgow Salvage Association and of the Liverpool and London committees of Lloyd's Register of Shipping

LT.-CMDR. H. B. CADOGAN, R.N.R., an Associate of the Institution of Naval Architects, is marine superintendent of Semtex, Ltd., a subsidiary of the Dunlop organisation. He spent more than 16 years in the Royal and Merchant Navies before joining the company, in 1946, as marine representative. He has been chiefly responsible for the considerable progress made in the use of Semtex materials in ships since the war years. Cmdr. Cadogan has played a prominent part in developing those ship deck coverings which incorporate natural latex and synthetic resins



SITUATIONS VACANT

ASSISTANT Ship Manager required for large Ship repair Yard on North East Coast. Must have previous experience in organising and directing repair work afloat and in drydock. Knowledge of estimating desirable. Reply giving age, details of training and experience and salary required to Box 207, THE SHIPPING WORLD, LTD., Effingham House, 1, Arundel Street, Strand, London, W.C.2.

ADMIRALTY

APPLICATIONS are invited from SHIP DRAUGHTSMEN for temporary service in the Naval Construction Department, Admiralty, at Bath.

Candidates must be British subjects of 21 years of age and upwards and should have had drawing office experience in a shipyard.

Salary will be assessed according to age, qualifications and experience within the range £284-£495 per annum.

Applications, stating age and details of technical qualifications and apprenticeship and Drawing Office experience, should be sent to Admiralty (C.E. II, Room 881 Empire Hotel, Bath, quoting "DNC DM." Candidates required for interview will be advised within two weeks of receipt of application.

AGENCIES WANTED

NEWLY established shipping firm in Copenhagen, Denmark, seeks representation of English factories producing articles of interest to shipyards, owners, etc. Best references. Box No. 206, THE SHIPPING WORLD, LTD., 1, Arundel Street, London, W.C.2.

FOR SALE

TUGS FOR SALE 250 h.p. 70ft. Hull and Diesel engine reconditioned. Demonstrations in Thames Estuary. Apply Fairmile Construction Co. Ltd., Cobham, Surrey.

FOR SALE.

THE proprietor of British Patent No. 595462, entitled "Wave damping crib," offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 24 E., Jackson Boulevard, Chicago 4, Illinois, U.S.A.

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